© Siemens AG 2013

Code reading systems

5

5/2 **Code reading systems introduction**

5/5 **Stationary code reading system**
5/10 SIMATIC MV420
5/18 SIMATIC MV440
5/30 Lenses

5/34 **Handheld reading systems**
5/36 SIMATIC MV320
5/37 SIMATIC MV325
5/38 SIMATIC MV340

5/40 **Verification systems**
5/40 Veri-Genius for SIMATIC MV440

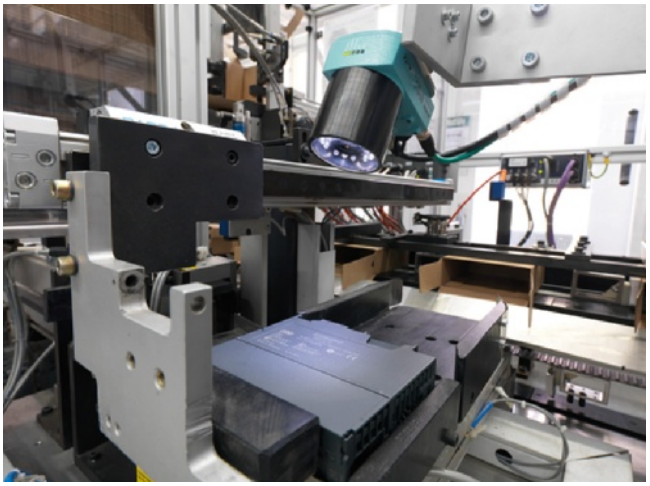
5/45 **Optical character recognition (OCR)**
5/45 Text-Genius for SIMATIC MV440

5/49 **Object recognition**
5/49 Pat-Genius for SIMATIC MV440

© Siemens AG 2013

Code Reading Systems

Overview



Code reading systems – Reading and verification of 1D/2D codes

For state-of-the-art production systems, tracing products and parts with machine-readable identification is a central requirement. A unique coding system permits the planning of each and every step of production for every part manufactured and changes within the production process or in the materials used. Direct marking of products also allows the implementation of specified legal requirements for tracing production batches throughout the production system.

What is Direct Part Marking (DPM)?

Direct Part Marking (DPM) is the application of a mark directly on the surface of a product without the use of a separate carrier material, such as an adhesive label. This makes it possible to identify products in production and tracing them after delivery as well.

With so-called 2D codes a coding method is available that meets these user requirements. 2D codes consist of easy to implement, point-shaped basic elements. Laser and needle marking technologies are outstanding regarding durability, marking speed and material independence. Despite mechanical deformations, e.g. with metallic workpieces, the 2D codes can still be read using 2D read devices even after multiple processing steps. 2D codes also provide the advantage of being able to encode data in more limited spaces than comparable barcodes or text

Benefits

get Designed for Industry

- Unique identification of products or product parts - Direct Part Marking is the key technology for product traceability.
- Flexible and economic solutions thanks to the complete and scalable portfolio of powerful stationary code reading systems.
- Simplified engineering, commissioning, diagnostics and maintenance through seamless integration into Totally Integrated Automation:
  - Integrated bus connection to an automation system, such as SIMATIC, SIMOTION or SINUMERIK via communication modules with PROFIBUS and PROFINET.
  - Simple S7 software integration via ready-to-use function blocks.
  - Extensive status and diagnostic functions.
- Greater security of investment due to support of all standard matrix and bar codes.
- Openness through connection possibilities to various bus systems from different manufacturers and PC environments via communication modules.

© Siemens AG 2013

Integration

The product range of Siemens code reading systems

Stationary code reading systems

SIMATIC MV440 and MV420 stationary code reading systems

The stationary code reading systems include compact basic and high-performance reading devices. The devices read various two-dimensional (2D) codes as well as one-dimensional (1D) barcodes. Optionally, function packages can be added to all SIMATIC MV440 devices using SIMATIC License Manager licenses. The following licenses are available for function expansion:

- Veri-Genius for measuring the marking quality
- Text-Genius for text recognition and
- Pat-Genius for object recognition

These optional modules can be combined as desired.

The SIMATIC MV440 can also read plain text (Optical Character Recognition: OCR)

Hand-held reading systems

SIMATIC MV320 handheld reading system

MV325 handheld reading system

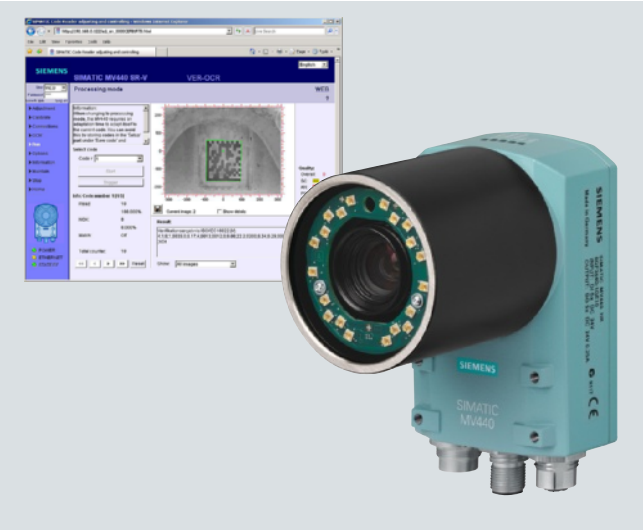
SIMATIC MV340 handheld reading system

These hand-held reading systems are powerful, high-resolution readers for either two-dimensional (2D) data matrix codes and/or one-dimensional bar codes (1D). The devices can communicate with a host via RS232, USB and Bluetooth, depending on the selected model.

© Siemens AG 2013

Code Reading Systems

Verification systems



By using verification systems, the readability of marks is guaranteed throughout the entire production process, regardless of any possible contamination or when using different readers. Moreover, the marking can continue to be read after the production process throughout the lifespan of the product.

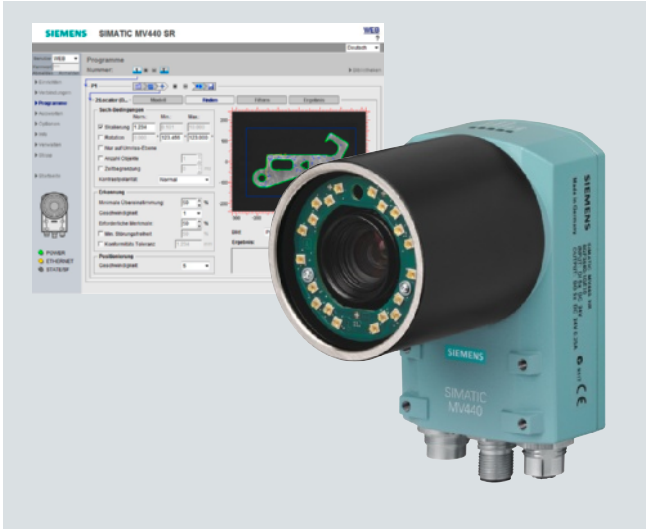
In addition to reading 1D bar codes and 2D matrix codes, SIMATIC MV440 can be expanded at any time with verification functionality using the "Veri-Genius" verification license. The license is supplied as a "Single License" on a USB stick and can be copied to the SIMATIC MV440 with the SIMATIC Automation License Manager (ALM) using a plug-in. The license is executable on any SIMATIC MV440 as of firmware version 4.0.

Optical character recognition

With the "Text Genius" OCR license, SIMATIC MV440 can also be used for optical character recognition (OCR) in addition to reading 1D bar codes and 2D matrix codes. It is also possible to read and compare plain text and machine-readable code in the same image field.

The license is supplied as a "Single License" on a USB stick and can be copied to the device with the SIMATIC Automation License Manager (ALM) using a plug-in. The license runs on every SIMATIC MV440, firmware version 3.0 or higher.

Object recognition



With the "Pat Genius" object recognition license, SIMATIC MV440 can also be used for object recognition (object classification, position detection, counting, etc.) in addition to reading 1D bar codes and 2D matrix codes. In addition, the functionality is possible in combination with text recognition, for example, thus enabling position control of a label and control of the labeling (reading and comparison) of plain text in an image field.

The license is supplied as a "Single License" on a USB stick and can be copied to the device with the SIMATIC Automation License Manager (ALM) using a plug-in. The license runs on every SIMATIC MV440.

© Siemens AG 2013

Overview

The stationary code reading systems read various two-dimensional (2D) codes and one-dimensional (1D) barcodes. Some readers also feature functions for measuring the marking quality (verification) for process control purposes, and for text recognition (optical character recognition, OCR). All devices can be easily and flexibly integrated into the automation system thanks to standardized, industry-compatible interfaces and function blocks.

SIMATIC MV420

The SIMATIC MV420 series is particularly suitable for close-up to mid-range reading distances (approx. 10 mm to 400 mm).

SIMATIC MV420 is an optical code reading system that has been specially designed for detecting and evaluating a variety of machine readable codes in the packaging industry (e.g. F&B, pharmaceuticals and tobacco) and industrial production (e.g. automotive, electronics and solar). The list of readable codes includes all standard matrix and bar codes which can be reliably detected - mostly independent of the printing technology and carrier medium used. One key feature of the unit is its ability to read data matrix codes (DMC). The SIMATIC MV420 device family is flexible, reliable and easy to use.

Besides this, two different lenses are available for the SIMATIC MV420 which can be adjusted to the required reading distances. In addition, various powerful integrated illumination systems are available. The models can be ordered as preconfigured or freely combinable. The particularly compact enclosures have a high IP67 degree of protection.

SIMATIC MV440

SIMATIC MV440 is an optical code reading system that has been specially designed for detecting and evaluating a number of machine readable codes in industrial production. The SIMATIC MV440 device family is characterized by very high reading reliability, high-speed reading and flexible process interfacing. The product is also rugged, has a high degree of protection and is easy to use. The professional decoding software is suitable for almost all types of marking, especially for sophisticated "direct part marking", on a wide range of different carrier materials.

With the "Veri-Genius" verification license, MV440 code readers are able to verify the marking quality of codes in accordance with the applicable standards. The device determines the quality of the applied code and helps you ensure the readability using the following process steps. Verification can be performed simultaneously with the other functions, e.g. 1D and 2D code reading.

With the "Text-Genius" text recognition license, MV440 code readers can be used for text recognition (optical character recognition, OCR). Text recognition can be performed simultaneously with the other functions, e.g. 1D and 2D code reading.

The "Pat-Genius" object recognition licence lets you perform object recognition (classification), position detection, presence check, completeness check and text recognition (based on the contour of any character or symbol). The object recognition can also be combined with the other functions.

© Siemens AG 2013

Introduction

Major differences

Code reading system	SIMATIC MV420	SIMATIC MV440
Housing	Extremely compact design, IP67	Compact design, IP67
Sensor / resolution	CMOS 640 x 480 pixels 752 x 480 pixels	CCD 640 x 480 pixels 1 024 x 768 pixels 1 600 x 1 200 pixels
Lens system	Freely selectable lenses (M12)	Freely selectable lenses due to C-Mount lens connection
Lighting	Integrated lighting	Integrated or external lighting
Commissioning and operation	• Integrated web server • Auto-optimizing of parameters • Languages: German / English / French / Italian / Spanish / Chinese	• Integrated web server • Auto-optimizing of parameters • Languages: German / English / French / Italian / Spanish / Chinese
Communication	• PROFIBUS (via communication module; M12) • PROFINET (on-board M12 or via communication module, various interfaces) • Ethernet (onboard, M12) • RS232 (onboard, M16)	• PROFIBUS (via communication module, M12) • PROFINET (on-board M12 or via communication module, various interfaces) • Ethernet (onboard, M12) • RS232 (onboard, M16)
Optical character recognition	–	Polyfont
Verification	–	• ISO/IEC 16022:2000 • ISO/IEC 15415:2004 • AS9132 Rev A, 2005 • ISO/IEC 15416:2000 • ANSI X3.182-1990 • Siemens DPM • AIM DPM-1-2006

5

Application

- Automobile industry
  - Needle punched markings on various automotive power train components (cylinder heads, cylinder blocks, manifolds, etc.)
  - Laser markings on various automotive power train components (camshafts, crankshafts, pistons, connecting rods, transmission components, etc.)
  - Laser markings on electronic components, printed circuit boards, or enclosures
- Packaging industry (e.g. pharmaceuticals, F&B, tobacco)
  - Printed or laser markings on folded boxes, plastic containers, etc.
- Aerospace industry
  - Needle punched markings on gas turbine blades
  - Needle punched markings on various aluminium components of propulsion units
- Medical equipment
  - Laser markings on pacemakers and other implantable devices
  - Laser markings on various medical device components and enclosures
- Electronics
  - Laser markings on ESD sensitive hard drive components or even on printed labels
- Semiconductors
  - Laser markings on rigid and flexible circuit boards
  - Laser markings on packaged semiconductor devices, heat sinks or heat dissipators

© Siemens AG 2013

Integration

The SIMATIC MV420/440 code readers have industry-standard PROFINET and communication module interfaces on the device. In addition, communications interfaces such as Ethernet and RS232 are directly available on the device.

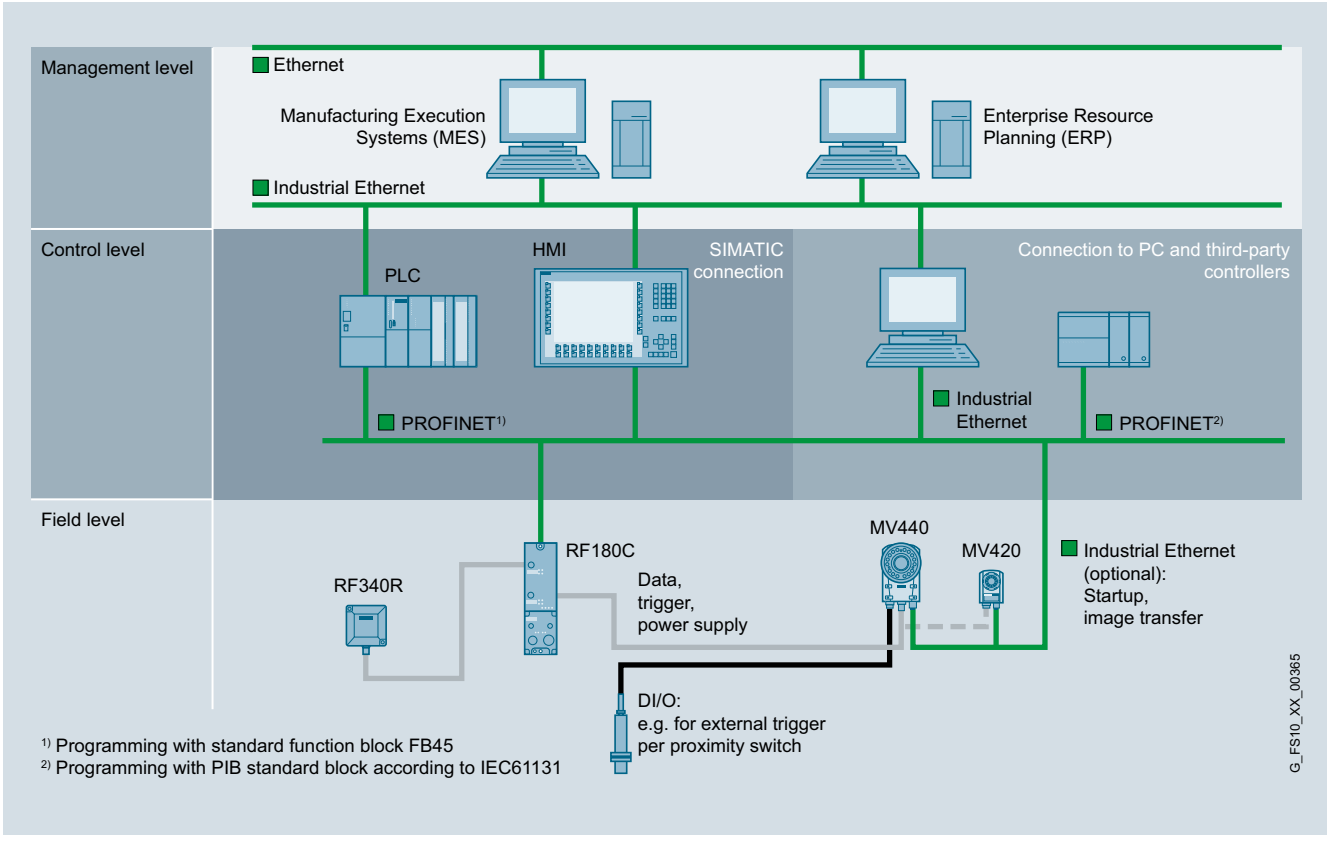
Via the specified interfaces, the following communication services can be used:

Usable communication services	Interface
PROFINET IO (FB79)	Onboard MV440 PROFINET interface.
PROFINET IO (FB101, Ident profile)	Onboard MV440 PROFINET interface.
PROFINET IO (FB45, FB101, Ident profile)	Via communication module interface using the RF180C communication module
PROFIBUS DP V0/1 (FB45, Ident profile)	Via communication module interface using the ASM 456 communication module
TCP/IP native	Onboard MV440 PROFINET interface.
RS-232 (ASCII)	Onboard MV440 RS232 interface.

Via the communication module interface, all communication modules can be used, e.g. for the PROFIBUS connection. The communication module interface is compatible with all available communication modules both electrically and with regard to protocol. Connection via a communication module makes it easy to switch between optical code reading with SIMATIC MV420/440 and RFID readers, simply by reconnection. The PLC programming is performed with the aid of function blocks that are available for SIMATIC and SIMOTION.

The advantage of connecting SIMATIC MV420/440 to a communication module is that a uniform programming interface is available for a wide variety of PLC types and fieldbus systems. In addition, the complete cable portfolio for the communication module interface is available.

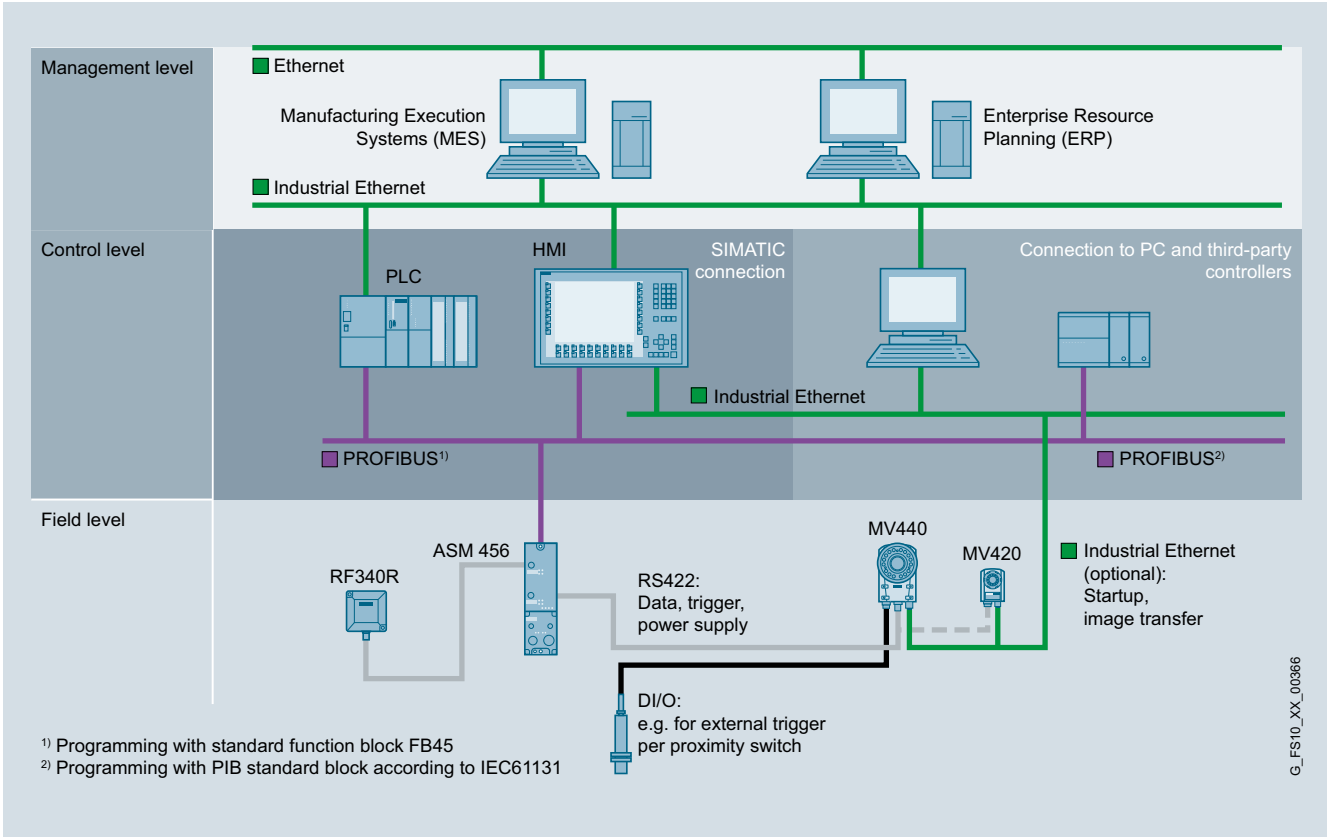
At the same time as being connected via a communication module to the process (transmission of read result), the PROFINET interface on the device can also be used for a separate interface to HMI or a control desk.



Integration of SIMATIC MV420/MV440 by means of the SIMATIC RF180C communication module

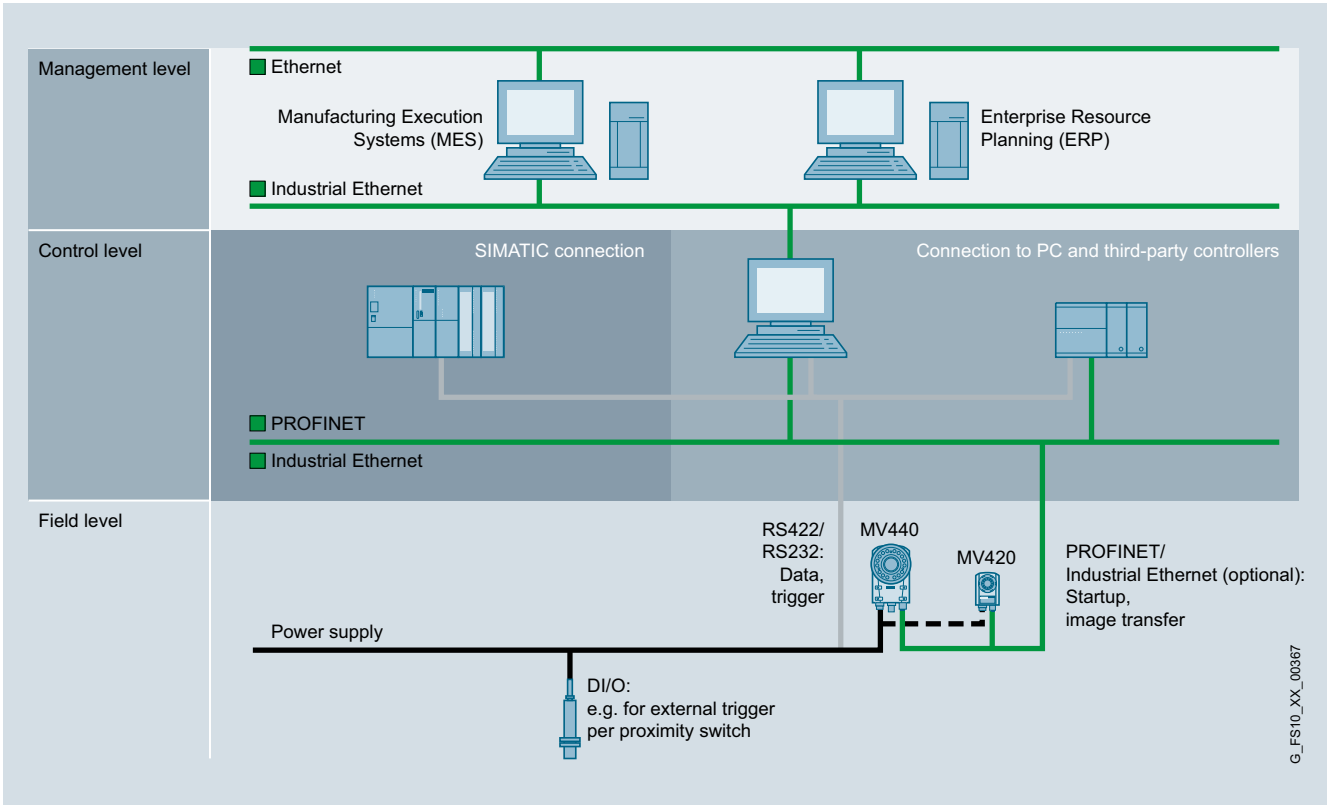
© Siemens AG 2013

Introduction



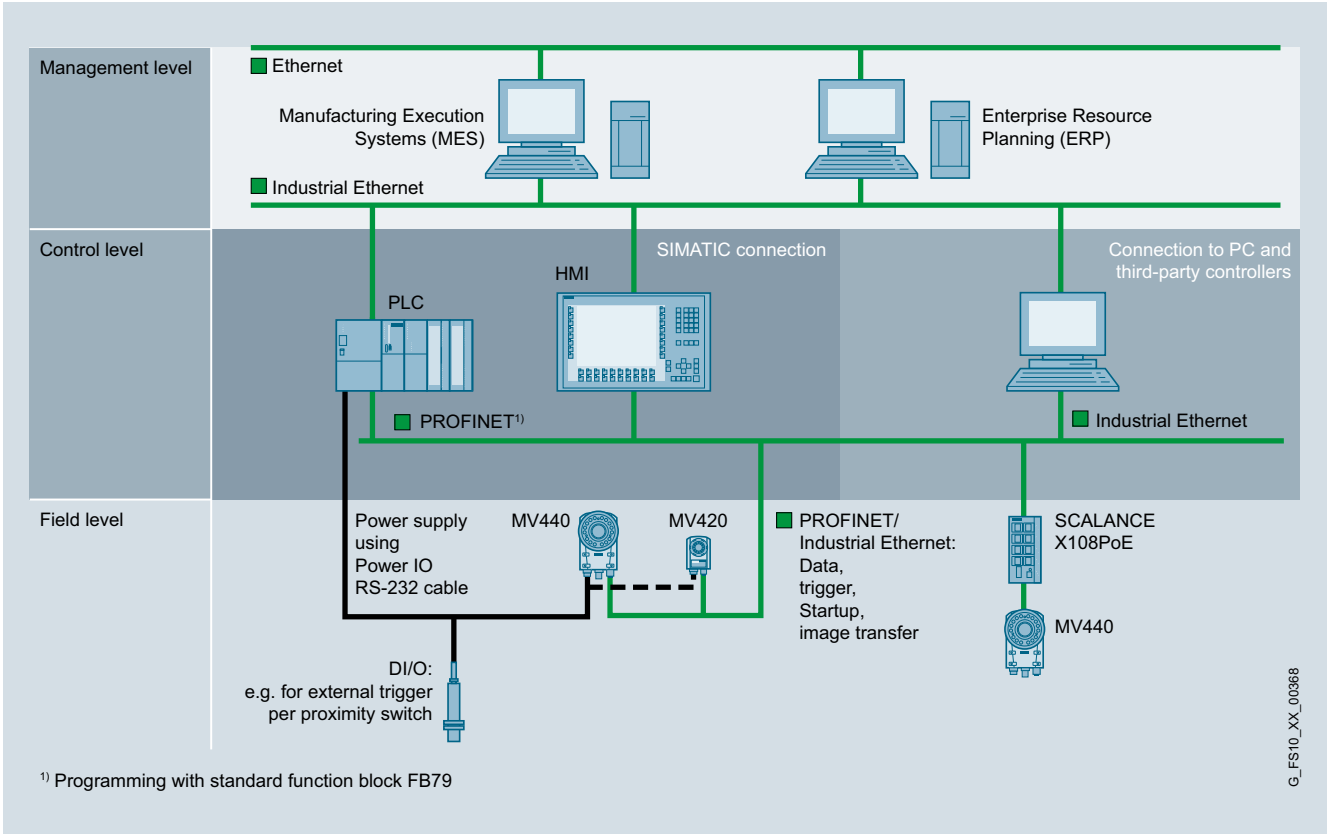
Integration of SIMATIC MV420/MV440 by means of the ASM 456 communication module

5



Integration of SIMATIC MV420/MV440 with connection via RS232

© Siemens AG 2013



Integration of SIMATIC MV420/MV440 with a direct connection to PROFINET or Ethernet

© Siemens AG 2013

SIMATIC MV420

Overview

The SIMATIC MV420 is a particularly compact code reading system suitable for close-up to mid-range reading distances (approx. 10 mm to 400 mm).

SIMATIC MV420 has been specifically designed for detecting and evaluating a variety of machine readable codes in the packaging industry (e.g. F&B, pharmaceuticals, and tobacco) and industrial production (e.g. automotive, electronics, and solar). The list of readable codes includes all standard matrix codes and bar codes which can be reliably detected - mostly independent of the printing technology applied and carrier medium used. One key feature of the unit is its ability to read data matrix codes (DMC). The SIMATIC MV420 device family is flexible, reliable and easy to use.

Highlights at a glance:

- Compact design with IP67 degree of protection.
- Variety of lenses with variable reading distances.
- Integrated high-performance lighting.
- Web server technology: Parameterizable with regular Web browser.
- Interfaces: Ethernet, PROFINET, RS232, DI/DO, and direct connection to RFID communication modules (ASM).
- Exceptionally high reading speeds, depending on the model.

Further important product characteristics are:

- Excellent read algorithms based on the SIMATIC MV440 and VS130-2 code reading systems and many years of experience in industrial applications.
- No special knowledge required for reliable parameterization of reading features. Parameterization usually unnecessary, and is only required for difficult to read codes. "Setup" is performed automatically by presenting a readable code pattern.
- Code quality evaluation: displays the key quality parameters of the code to be read.
- Customized user interface can be easily generated with SIMATIC WinCC flexible/WinCC.
- Web-based user interface; can run on a variety of platforms meeting the following requirements: Internet browser (IE 6.0 or higher), JAVA-VM (MS, SUN).
- Password protected user interface with integrated access rights administration.
- Web-based user interface available for easy integration with an HMI device. The browser and JAVA VM requirements previously mentioned also apply in this case.
- 6 language versions (operator interface, manual and online help are each available in German, English, French, Spanish, Italian, and Chinese).

In addition, SIMATIC MV420 SR-P offers the following highlights:

- Autotrigger mode: Automatic detection of a code without an external trigger signal
  - Saving of sensor technology and cabling
  - Reduced potential for error as there are fewer components
  - Solution for applications where proximity switches and light barriers cannot be used
- Open web API interface for comfortable creation of customized applications and PC based camera remote control
- Multicode: reads multiple codes in one step within the same field of view.
  - ID-Genius: a high-performance code reading algorithm for poorly legible directly marked data matrix codes (DPM: Direct Part Marking)

Application

Key features of the SIMATIC MV420:

- Code reading
- Comparing the read result with a preset value
- Formatting of read results for further use

The range of application for the SIMATIC MV420 product family extends to practically all areas of industrial production. The possibilities for use range from identification of stationary parts to fast moving parts on conveyor systems. The high-performance integrated lighting allows for an extremely compact design. The unit is protected from environmental influences with a degree of protection IP67. The SIMATIC MV420 code readers are therefore suitable for all industrial applications, also for direct marking (Direct Part Marking - DPM). In addition to industrial production, thanks to its small size and flexibility, the SIMATIC MV420 code reader is also ideally suited to the packaging industry (e.g. F&B, pharmaceuticals and tobacco).

The MV420 code readers include all common communication interfaces, such as Ethernet or PROFINET, and can therefore be connected to a wide variety of systems. An integrated RS422 interface makes it possible to use all of the RFID communication modules, such those required for the PROFIBUS connection. In this case, the combination of code reader and RFID reader is also possible on one communication module.

The reading devices are particularly easy to use and commission despite the wide variety of options for use. Parameters are automatically configured for most applications. If reconfiguration is required, however, parameterization can be carried out without the need for pre-installed software via the integrated Web server using an Internet browser.

© Siemens AG 2013

Due to the properties and functions described, the emphasis for MV420 is on the following sectors and applications:

- Automobile industry:
  - Needle markings on various drive components (DPM), e.g. cylinder heads, cylinder blocks, manifolds.
  - Laser markings on various power train components (DPM), e.g. camshafts, crankshafts, cylinder piston, connecting rods, gearbox components.
  - Laser markings on electronic components, printed circuit boards, or enclosures.
- Pharmaceutical industry, food industry (F&B), tobacco industry:
  - Print or laser markings on medicines (DPM, OCR).
  - Recording the contents of cartons (up to 150 codes).
  - Read portal by linking several cameras.
- Aerospace industry:
  - Needle or laser markings on gas turbine blades (DPM).
  - Needle or laser markings on jet engine components (DPM).
- Medical equipment:
  - Laser markings on heart pacemakers and other implants (DPM).
  - Laser markings on medical devices (DPM).
- Electronics:
  - Needle or laser markings on hard disk components.
  - Lasered or etched markings on hard disk components (DPM).
- Semiconductors:
  - Laser markings on rigid and flexible circuit boards (DPM).
  - Laser markings on enclosed semiconductor components, heat sinks or heat exchangers (DPM).

More information is available in the accompanying manual.

Design

SIMATIC MV420 is a particularly compact code reading system. The device can be assembled from individual components or ordered as a ready-assembled unit. The MV420 is available in two versions:

- Basic model: SIMATIC MV420 SR-B
- Performance model: SIMATIC MV420 SR-P

For the individually configurable models the following individual components are available in addition to the basic units (body):

- Lenses
- Ring lights

The basic units include the protective barrel for the lens.

The preconfigured models include an integrated lens (6 mm, aperture 5.6) and a red ring light including protective barrel.

The following accessories are available for the connection and installation:

- Flexible mounting angle
- Power DIO RS232 cable (M16 connector on open end)
- M12 Ethernet cable (varying lengths)
- Ethernet cable (M12 to RJ45) for commissioning/lab operation; 2 m in length
- Special communication module cable for M16 connector (M16 to M12) for connecting to RFID communication modules (ASM). Can be expanded using standard communication module cables, if required.
- Plug-in power supply for demonstration and lab operation (for office environment only)
- CD with installation/operating instructions (supplied with unit)

Further information can be found in the supplied manual.

© Siemens AG 2013

SIMATIC MV420

Function

Key features of the SIMATIC MV420:

- Code reading (refer to "Overview" and "Application")
- Formatting of read results for further use and/or comparison
- Comparing the read result with a preset value
  - Specification of a comparison string via one of the serial ports (PROFINET (ASM and onboard), PROFIBUS (ASM), RS232)
  - Comparison of the formatted read results with the comparison string

The functions can be used individually or they can be combined.

The SIMATIC MV420 reads the following codes:

- 1D codes (barcodes):
  - Int. 2/5 (no checksum)
  - Int. 2/5+CS (checksum included)
  - Code 128
  - Code 39 (no checksum)
  - Code 39+CS (checksum included)
  - EAN 13
  - EAN 8
  - UPC-A
  - UPC-E
  - GS1 Databar 14
  - GS1 Databar Stacked
  - GS1 Databar Limited
  - GS1 Databar Expanded
- 2D codes:
  - DMC
  - PDF417
  - QR
  - DotCode
  - Vericode

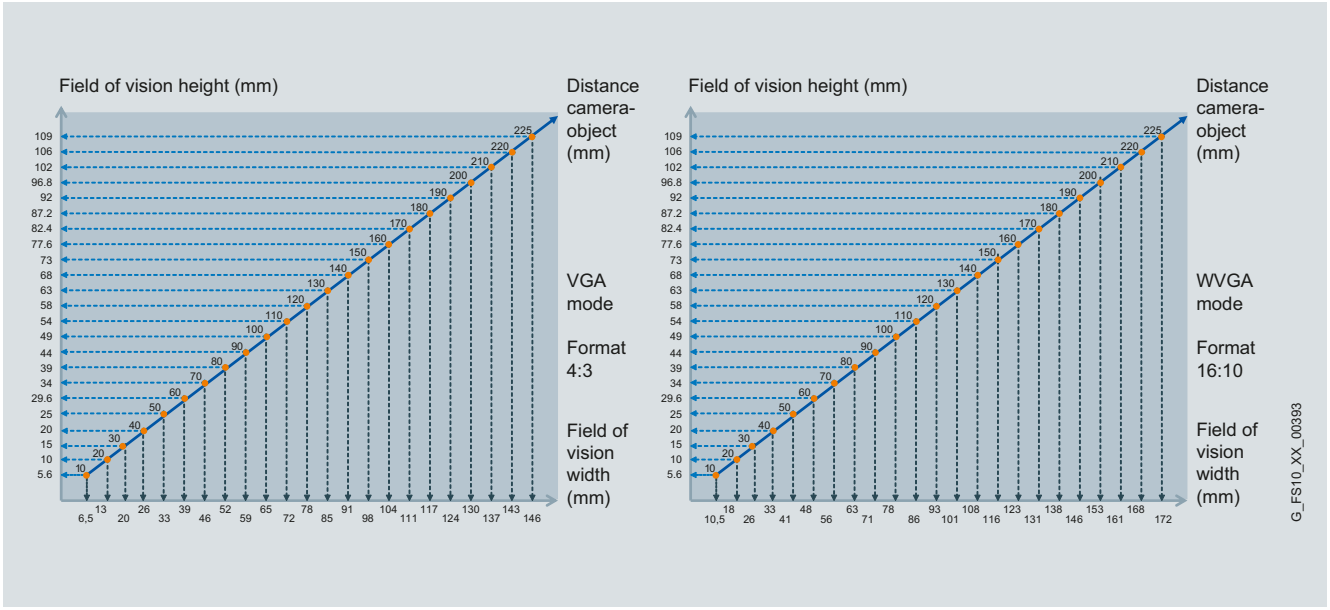
The SIMATIC MV420 reads the codes found on a wide variety of components and surfaces, including:

- Paper or plastic labels
- Plastic parts
- Circuit boards
- Metallic objects

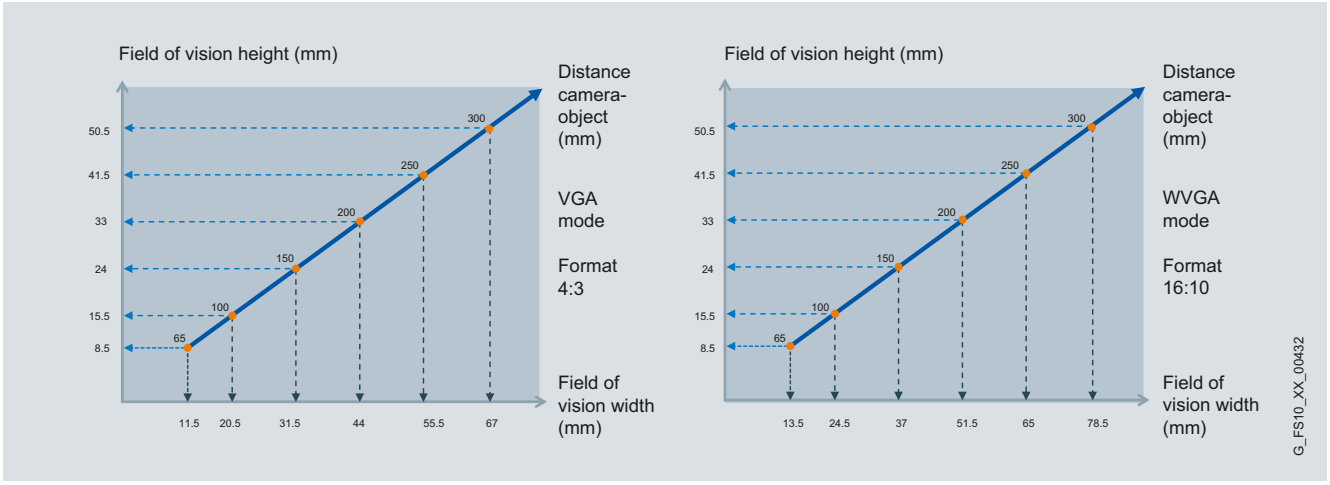
The SIMATIC MV420 reads codes of a wide variety of marking types, such as:

- Printed
- Dot peened
- Laser
- Stamped
- Bored

© Siemens AG 2013



SIMATIC MV420 field of view dimensions for the 6 mm lens



SIMATIC MV420 field of view dimensions for the 16 mm lens

Further information can be found in the supplied manual.

Integration

Various onboard connection options and convenient function blocks are available for the integration into the automation level.

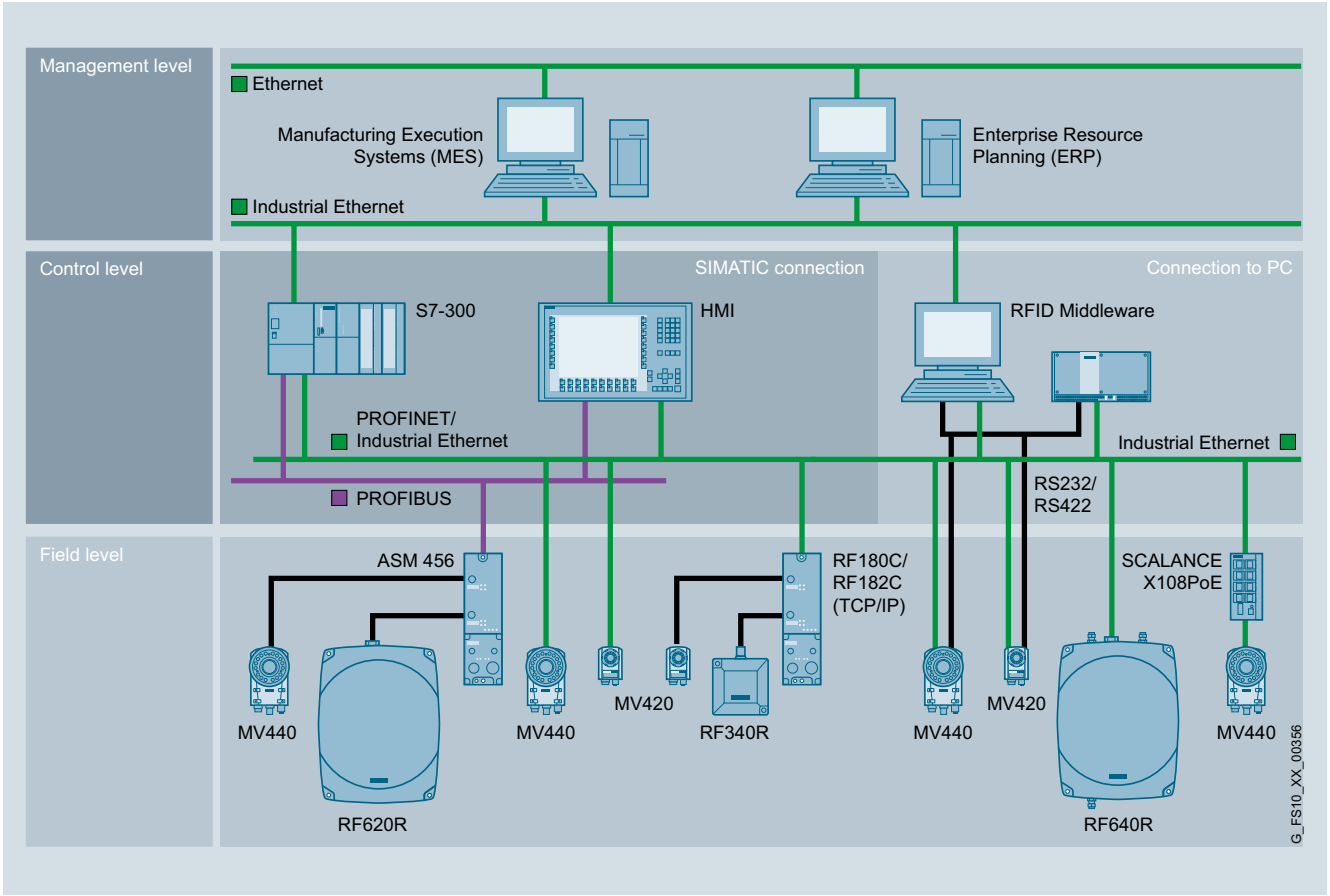
In the case of SIMATIC MV420, direct connection via PROFINET, Ethernet or RS232 is possible.

In addition, communication modules are available for connection to other bus systems or the shared interface with RFID readers.

For further details on the communication modules, see the section 6, "Communication modules".

© Siemens AG 2013

SIMATIC MV420



Integration of the SIMATIC MV420 in the automation environment

5

Technical specifications

Order No.	6GF3 420-0AA20	6GF3 420-0AA40
Product-type designation	**MV420 SR-B code reader**	**MV420 SR-P code reader**
Suitability for installation	1D codes: Int. 2/5, Code 128, Code 39, EAN 13, EAN 8, UPC-A, UPC-E, GS1, 2D codes: DMC, PDF417 (without: Truncated, Micro and Macro), QR (without: Micro and Macro), Vericode	1D codes: Int. 2/5, Code 128, Code 39, EAN 13, EAN 8, UPC-A, UPC-E, GS1, 2D codes: DMC, PDF417 (without: Truncated, Micro and Macro), QR (without: Micro and Macro), Vericode
Interfaces		
Design of the electrical connection the Industrial Ethernet Interface	M12, d-coded	M12, d-coded
Design of the electrical connection of the PROFIBUS interface	-	-
Design of electrical connection of RS 422 interface	M16, 12-pin	M16, 12-pin
Design of electrical connection of RS 232 interface	M16, 12-pin	M16, 12-pin
Design of electrical connection for supply voltage	M16, 12-pin	M16, 12-pin
Design of electrical connection at the digital inputs/outputs	M16, 12-pin	M16, 12-pin
Number of digital inputs	1	1
Number of digital outputs	3	3
Design of digital inputs	One high-speed trigger input	One high-speed trigger input
Design of digital outputs	• 2 isolated outputs 50 mA, • 1 high-speed trigger input for external lighting	• 2 isolated outputs 50 mA, • 1 high-speed trigger input for external lighting

© Siemens AG 2013

Order No.	6GF3 420-0AA20	6GF3 420-0AA40
Product-type designation	**MV420 SR-B code reader**	**MV420 SR-P code reader**
Optical data		
Design of image sensor of camera	CMOS chip, VGA (640 x 480), WVGA (752 x 480)	CMOS chip, VGA (640 x 480), WVGA (752 x 480)
Type of image capture	Global shutter	Global shutter
Range	10 … 400 mm	10 … 400 mm
• Note	Adjustable within the range	Adjustable within the range
Mounting type of lens	Fixed (M12)	Fixed (M12)
Nature of fluorescent material	Integrated lighting or external lighting according to accessories list	Integrated lighting or external lighting according to accessories list
Image acquisition frequency, maximum	50 Hz	80 Hz
Code reading rate, maximum	29 1/s	50 1/s
Type of focusing	Manual adjustment on the lens cover	Manual adjustment on the lens cover
Supply voltage, current consumption, power loss		
Supply voltage for DC, rated value	24 V	24 V
Supply voltage		
• for DC	19.2 … 28.8 V	19.2 … 28.8 V
Consumed current at 24 V DC		
• typical	0.17 A	0.17 A
• maximum	2 A	2 A
Stored energy time supply voltage failure, minimum	0.01 s	0.01 s
Mechanical data		
Material	Die-cast aluminum	Die-cast aluminum
Color	Petrol blue	Petrol blue
Permitted ambient conditions		
Ambient temperature		
• during operating	0 … 50 °C	0 … 50 °C
• during storage	-30 … +70 °C	-30 … +70 °C
• during transport	-30 … +70 °C	-30 … +70 °C
Relative humidity at 25 °C without condensation during operating, maximum	95 %	95 %
Protection class IP	IP67	IP67
Resistance against shock	According to IEC 60068-2	According to IEC 60068-2
Resistance against shock	150 m/s^2	150 m/s^2
Resistance against vibration	10 m/s^2	10 m/s^2
Design, dimensions and weight		
Width	52.5 mm	52.5 mm
Height	70.7 mm	70.7 mm
Depth	39.5 mm	39.5 mm
Net weight	0.25 kg	0.25 kg
Type of mounting	2 x M4 screws	2 x M4 screws
Product properties, functions, components general		
Product feature silicon-free	Yes	Yes
Type of display	4 LEDs	4 LEDs
Standards, specifications, approvals		
Verification of suitability	CE, KCC, F&B suitable, UL	CE, KCC, F&B suitable, UL
Accessories		
Accessories	Mounting brackets, built-in ring lamps, M12 lenses	Mounting brackets, built-in ring lamps, M12 lenses

© Siemens AG 2013

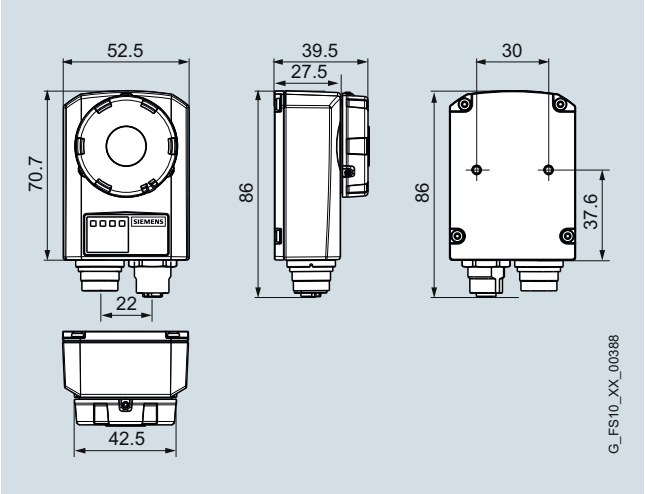
Selection and ordering data

	Order No.
SIMATIC MV420 SR-B	**6GF3420-0AA20**
Pre-configured basic model: Including lens (6 mm, aperture 5.6) and a red ring light, without multicode and ID-Genius algorithm	
SIMATIC MV420 SR-P	**6GF3420-0AA40**
Preconfigured performance model Including lens (6 mm, aperture 5.6) and a red ring light, for very fast read rates, with multicode and ID-Genius algorithm	
SIMATIC MV420 SR-B	**6GF3420-0AX20**
Basic model body: Does not include multicode or the ID-Genius algorithm	
SIMATIC MV420 SR-P	**6GF3420-0AX40**
Performance model body: For very high read rates; includes multicode reading and the ID-Genius algorithm	
Lens accessories	
Lens kit 6 mm	**6GF3420-0AC00-0LK0**
Lens 6 mm, aperture 5.6, including protective barrel	
Lens kit 16 mm	**6GF3420-0AC00-1LK0**
Lens 16 mm, aperture 4, including protective barrel	
Protective barrels for lenses	
Protective barrel replacement set	**6GF3420-0AC00-2AA0**
Contains: 2x protective barrel, 3x O-rings, 8x mounting screws, offset screwdriver	
Built-in ring lights	
Built-in ring lamp, red	**6GF3420-0AC00-1LT0**
Built-in ring lamp, white	**6GF3420-0AC00-2LT0**
Built-in ring lamp, infrared	**6GF3420-0AC00-3LT0**
Cables	
IE connecting cable M12-180/IE FC RJ45 plug-145 for commissioning, service and installation	**6XV1871-5TH20**
Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plug (D-coded) and IE FC RJ45 plug, IP65/IP67 degree of protection, length: 2 m	
IE Connecting Cable M12-180/M12-180	
Pre-assembled IE FC TP Trailing Cable GP 2 x 2 (PROFINET Type C) with two 4-pin M12 plugs (D-coded) up to 85 m, IP65/IP67 degree of protection. Lengths:	
0.3 m	**6XV1870-8AE30**
0.5 m	**6XV1870-8AE50**
1 m	**6XV1870-8AH10**
1.5 m	**6XV1870-8AH15**
2 m	**6XV1870-8AH20**
3 m	**6XV1870-8AH30**
5 m	**6XV1870-8AH50**
10 m	**6XV1870-8AN10**
15 m	**6XV1870-8AN15**
Industrial Ethernet FastConnect plug connector, 2x2, 180° cable outlet	**6GK1901-1BB10-2AA0**
RJ45 plug connector (10/100 Mbit/s) with rugged metal enclosure and FastConnect technology, for Industrial Ethernet FastConnect cable 2x2. For further cables, see Catalog IK PI under "Passive network components".	
Cable 24 V power supply	
Power cable, M16 pre-assembled, push-pull. Various lengths:	
1.5 m	**6GF3400-0BH15**
2 m	**6GF3400-1BH20**
Power supply cable DIO-RS232	
Power IO RS232 cable, M16 assembled on one end, open on other end Various lengths:	
10 m	**6GF3440-8BA2**
30 m	**6GF3440-8BA4**
Adapter cable for RFID communication modules (ASM)	**6GF3420-0AC00-2CB0**
M16 connector (MV420) to M12 connector (communication module); length: 2 m; expandable to any length with standard communication module cables.	
Cable for communication module interface	
Standard communication module cable for installation, pre-assembled connecting cable for ASM 456, RF160C, RF170C, RF180C, and RF182C. Various lengths:	
2 m	**6GT2891-4FH20**
5 m	**6GT2891-4FH50**
10 m	**6GT2891-4FN10**
20 m	**6GT2891-4FN20**
50 m	**6GT2891-4FN50**
Supports	
Mounting bracket for SIMATIC MV420	**6GF3420-0AC00-1AA0**

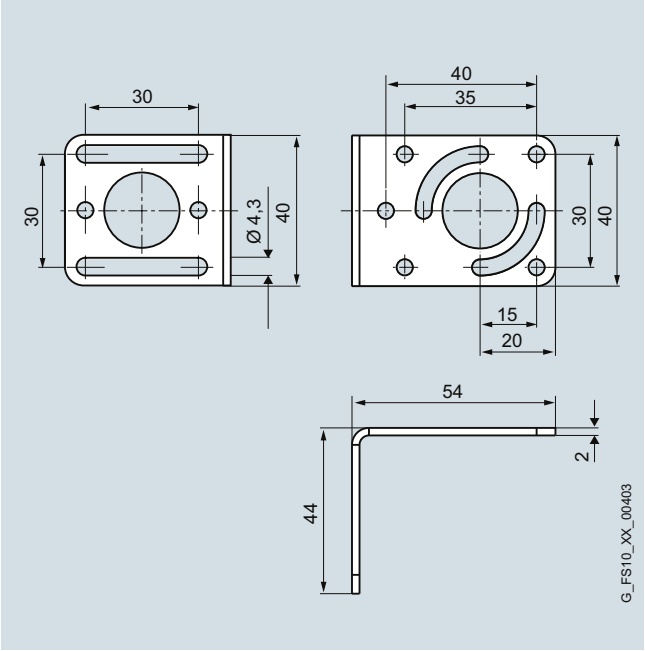
© Siemens AG 2013

	Order No.
Additional accessories	
SCALANCE X204-2 Industrial Ethernet Switch Industrial Ethernet switches with integral SNMP access, Web diagnostics, copper cable diagnostics, and PROFINET diagnostics for configuring line, star and ring topologies; with integrated redundancy manager (Exception: SCALANCE X208PRO); including operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM. With electrical and optical ports for glass multimode FOC up to max. 5 km: Four 10/100 Mbit/s RJ45 ports and two fiber-optic cable ports	**6GK5204-2BB10-2AA3**
Plug-in power supply (EU, US) For demo and lab operation (for office environment only)	**6GF3420-0AC00-1PS0**

Dimensional drawings



Code reading system SIMATIC MV420



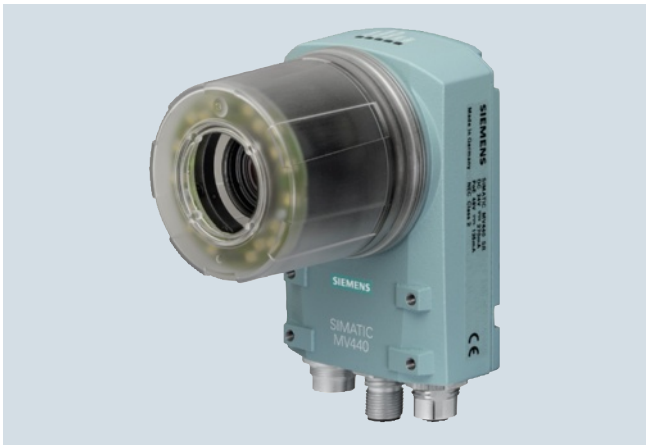
Mounting bracket for code reading system SIMATIC MV420

5

© Siemens AG 2013

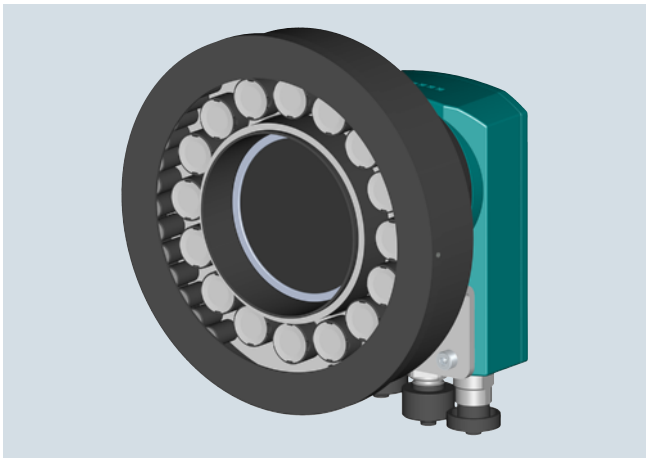
SIMATIC MV440

Overview



SIMATIC MV440 with built-in ring light and D65 protective barrel in plastic (included in the scope of supply)

SIMATIC MV440 with built-in ring light and D65 protective barrel (protective barrel available as accessory)



SIMATIC MV400 with external ring light and D65 protective barrel

The SIMATIC MV440 readers have been specially developed for use in industrial production. The devices offer professional decoding algorithms for machine-readable codes and text recognition in one device for production and logistics. The SIMATIC MV440 device family is characterized by flexibility, reliability and ease of use.

The list of readable codes includes all common matrix and barcodes which, regardless of the printing technology and the carrier medium used, are recognized reliably. A special feature of this device is its ability to read data matrix code (DMC) which is frequently used, especially in production, for direct part marking (DPM) and places the highest demands on the readers.

The operating range of the devices extends from close range 70 mm to distant range 3000 mm. Due to the freely selectable lenses and lighting, the working range as well as implementation in applications with special requirements is almost unrestricted. Integration in industrial automation environments is via standardized fieldbus technology, but open interfaces are also supported.

© Siemens AG 2013

Benefits

get Designed for Industry

Highlights at a glance:

- Compact design with IP67 degree of protection.
- Very high reading reliability and read rates thanks to Siemens decoding algorithms.
- Different screen resolutions can be selected specific to the application.
- Flexible adaptation to the application by means of freely selectable lenses and lighting.
- Option of integrated or external high-performance lighting
- Variety of interfaces: Ethernet (PoE), PROFINET (PoE), RS232, DI/DO, communication module interface.
- Wide range of connector technology can be used by means of communication modules.
- Function block for PROFINET/PROFIBUS can be used with SIMATIC and SIMOTION.
- Web-based user interface can be used for parameter assignment and monitoring, without the need for installation.

Further important product characteristics are:

- No special knowledge required for reliable parameterization of reading features. Automatic "setup" by presenting a readable code pattern.
- Autotrigger mode: automatic detection of a code without an external trigger signal
  - Savings in sensor technology and cabling.
  - Reduced potential for error as there are fewer components.
  - Solution for applications in which proximity switches and light barriers cannot be used.
- Multicode: Reads multiple codes in one step within the same field of view.
- ID-Genius: a high-performance code reading algorithm for poorly legible directly marked data matrix codes (DPM: Direct Part Marking).
- Code quality evaluation: Displays the key quality parameters of the code to be read.
- Customized user interface can be generated with SIMATIC WinCC flexible/WinCC.
- Open web API interface for comfortable creation of customized applications and PC based camera remote control
- Web-based user interface; can run on a variety of platforms meeting the following requirements: Internet browser (IE 6.0 or higher), JAVA-VM (MS, SUN).
- Extensive diagnostics functions ensure operation at the maximum read rate.
- User/password-protected operator interface with integrated management of access rights.
- 6 language versions (operator interface, manual and online help are each available in English, German, French, Spanish, Italian and Chinese).

Application

The main functions of SIMATIC MV440 are:

- Reading 1D and 2D codes.
- Optical character recognition (OCR).
- Verification (measuring the code quality).
- Comparing the read result with a preset value.
- Formatting of read results for further use.

The application range of the SIMATIC MV440 product family covers all sectors and areas of industrial production and logistics. The possible applications include the identification of stationary parts through to extremely fast moving parts on a conveyor belt. The powerful integrated lighting allows a very compact design. The device has IP67 degree of protection and is therefore equipped for harsh industrial environments.

Due to its particularly powerful lighting, lenses and sensor technology, MV440 specializes in direct part marking (DPM) applications. Due to the high picture quality, MV440 recommends itself for measuring the marking quality (verification) in the area of DPM.

Due to the properties and functions described, the emphasis for MV440 is on the following sectors and applications:

- Automobile industry:
  - Needle markings on various drive components (DPM), e.g. cylinder heads, cylinder blocks, manifolds.
  - Laser markings on various power train components (DPM), e.g. camshafts, crankshafts, cylinder piston, connecting rods, gearbox components.
  - Laser markings on electronic components, printed circuit boards, or enclosures.
- Pharmaceutical industry, food industry (F&B), tobacco industry:
  - Print or laser markings on medicines (DPM, OCR).
  - Recording the contents of cartons (up to 150 codes).
  - Read portal by linking several cameras.
- Aerospace industry:
  - Needle or laser markings on gas turbine blades (DPM).
  - Needle or laser markings on jet engine components (DPM).
- Medical equipment:
  - Laser markings on heart pacemakers and other implants (DPM).
  - Laser markings on medical devices (DPM).
- Electronics:
  - Needle or laser markings on hard disk components.
  - Lasered or etched markings on hard disk components (DPM).
- Semiconductors:
  - Laser markings on rigid and flexible circuit boards (DPM).
  - Laser markings on enclosed semiconductor components, heat sinks or heat exchangers (DPM).

Further information can be found in the supplied manual.

© Siemens AG 2013

SIMATIC MV440

Design

SIMATIC MV440 is a compact, stationary code reading system. It consists of one basic unit, which can be configured with other individual components (lens, ring light and protective barrel). This allows the MV440 to be optimally adapted to the application conditions.

The SIMATIC MV440 basic unit is available in three versions that differ only with regard to the resolution of the CCD sensor and the associated recording speed mode and read rate. All three versions of the basic unit have identical functionality:

- SIMATIC MV440 SR
  640 pixels x 480 pixels, 50 full screens/s
- SIMATIC MV440 HR
  1024 pixels x 768 pixels, 20 full screens/s
- SIMATIC MV440 UR
  1600 pixels x 1200 pixels, 15 full screens/s

Using the following accessories, the SIMATIC MV440 basic units can be tailored to the requirements of the application. For a detailed listing of the individual accessories, please refer to the section entitled "Accessories":

- Lenses
- Protective barrel for lens
- Ring lights

The following accessories are available for the connection and installation:

- Flexible mounting plate
- Power DIO RS232 cable (M16 connector on open end)
- M12 Ethernet cable (varying lengths)
- Ethernet cable (M12 to RJ45) for commissioning/lab operation; 2 m in length
- Special communication module cable for M16 connector (M16 to M12) for connecting to RFID communication modules (ASM). Can be expanded using standard communication module cables if required.
- Plug-in power supply for demonstration and lab operation (for office environment only)
- CD with installation/operating instructions (supplied with unit)

© Siemens AG 2013

The following configurations are recommended for the close or distant ranges:

Configuration for close range	Lenses	Ring lights	Protective barrel for lens
	Mini lens 8.5 mm	The built-in ring light cannot be used (alternative: external mounting of a ring light).	D65 protective barrels for lenses can be used.
	Mini lens 6 mm	Built-in ring lights can be used.	
	Mini lens 12 mm		
	Mini lens 16 mm		
	Mini lens 25 mm		
	Mini lens 35 mm		
	Mini lens 50 mm		
	Mini lens 75 mm		Use of the protective barrel extender required (on request).

Configuration for distant range	Lenses	Ring lights	Protective barrel for lens
	Mini lens 6 mm	External ring lights can be used.	D65 protective barrels for lenses can be used.
	Mini lens 8.5 mm		
	Mini lens 12 mm		
	Mini lens 16 mm		
	Mini lens 25 mm		
	Mini lens 35 mm		
	Mini lens 50 mm		
	Mini lens 75 mm		

Function

The main functions of SIMATIC MV440 are:

- **Reading** 1D and 2D codes
- **Verification** (requires license "Veri-Genius")
- **Text recognition** (requires license "Text-Genius")
- **Comparison** of the read result with a default value
- **Object recognition** (requires license "Pat-Genius")
- **Formatting** the read result for forwarding

The functions can be used individually or they can be combined.

Read

The SIMATIC MV440 reads the following 1D and 2D codes (detailed information can be found in the manual):

- 1D codes (barcodes):
  - Int. 2/5 (with/without checksum)
  - Code 128
  - Code 93
  - Code 39 (with/without checksum)
  - Code 32
  - EAN 13
  - EAN 8
  - UPC-A
  - UPC-E
  - CodaBar
  - GS1 DataBar (Omnidirectional, Stacked, Limited, Expanded)
  - Pharmacode (0° and 180°)
  - Postnet
- 2D codes:
  - Data Matrix Code (ECC 0 - 200)
  - PDF417 (without: Truncated, Micro and Macro)
  - QR (without: Micro and Macro)
  - DotCode
  - Vericode (demo mode/VeriCode license)

Verification

Code verification is the term used for measuring the marking quality of 1D and 2D codes. This additional functionality is subject to license and is available for every SIMATIC MV440 by installing the "Veri-Genius license". The following verification methods are supported:

- ISO/IEC TR29158 (previously AIM DPM-1-2006)
- Siemens DPM
- ISO/IEC 15415
- AS9132 Rev. A (previously IAQG)
- ISO/IEC 15416 (previously ANSI X3.182-1990)

For more detailed information, refer to the chapter "Verification systems".

© Siemens AG 2013

SIMATIC MV440

Optical character recognition

Text recognition is used to detect plain text (Optical Character Recognition: OCR). This additional functionality is subject to license and is available for every SIMATIC MV440 by installing the "Text-Genius license" or the "Text-Genius-Plus License". Text recognition with the "Text-Genius-Plus license" is able to recognize many fonts without training immediately after installation. Particularly suitable fonts are:

- OCR-A
- Semifont M13
- and similar fonts

With training ("Text-Genius-Plus license"), text recognition is able to recognize just about all fonts even with distortion and other influences resulting in varied representation. By contrast, this version requires training overhead but offers almost unlimited potential in expanding the characters to be recognized. For more detailed information, refer to the chapter "Text recognition".

Object recognition

Object recognition is used for finding and recognizing trained patterns in the picture. This functionality can be used in stand-along mode or in combination with all the other named functions, and therefore has different application areas. Shape recognition offers the following functionality:

- Object recognition (classification)
- Position detection (position, orientation, scaling)
- Presence check (object recognition and position check with setpoint specification)
- Completeness check (multiple presence check with setpoint specification)
- Text recognition (based on the contour of any character or symbol. However, shape recognition can also be used in combination with text recognition, for example. In this case, the text recognition read area can track the current position of an object or label.

For more detailed information, refer to the section on "Object recognition", page 5/49.

Note: In demo mode, the full functionality of the devices is available. Testing of a licensed function is therefore possible at any time. However, the output result is unusable, because one or more characters of the result will be randomly replaced by the character '?'. Binary results are completely suppressed.

© Siemens AG 2013

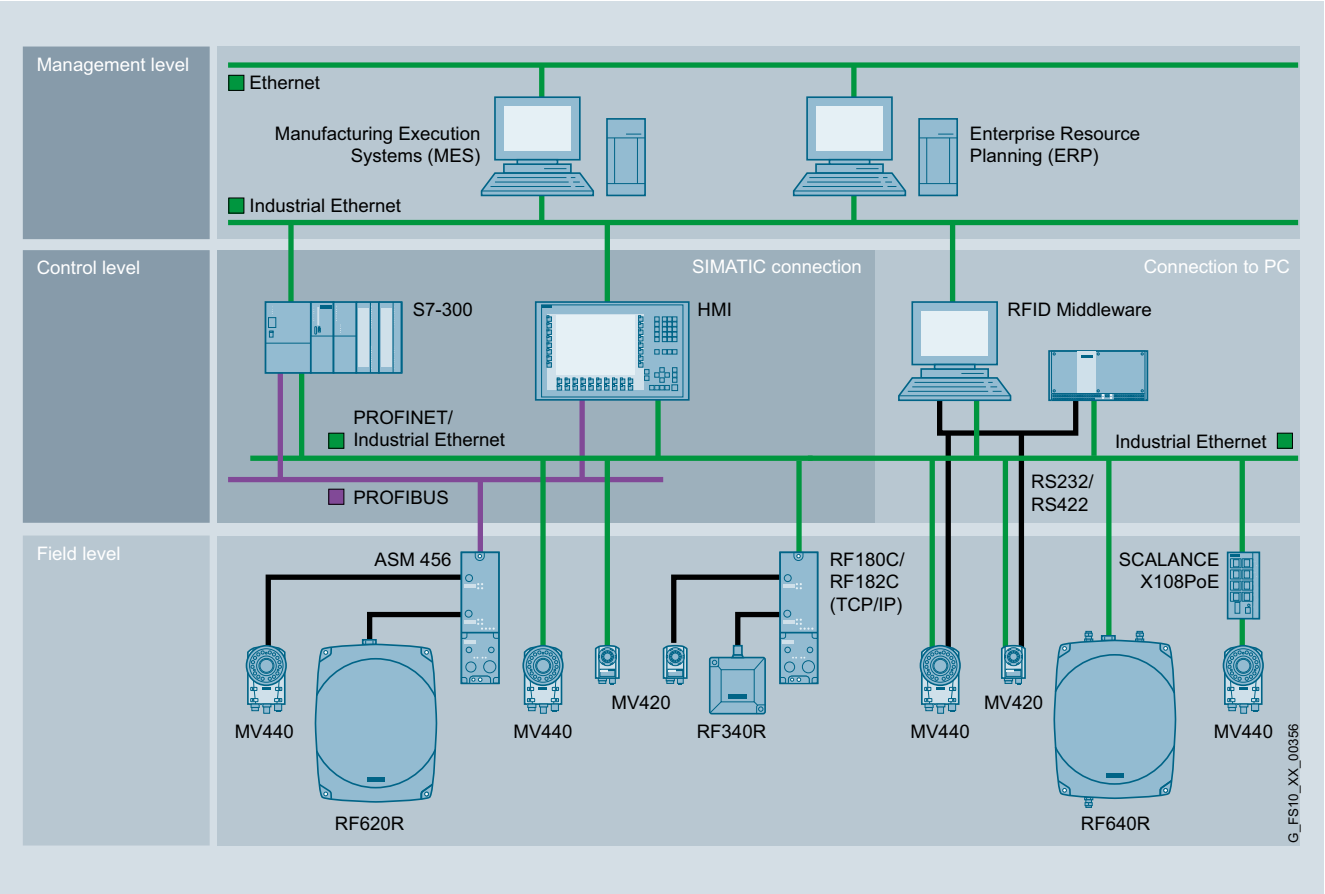
Integration

Various onboard connection options and convenient function blocks are available for the integration into the automation level.

In the case of SIMATIC MV440, for example, direct connection via PROFINET, Ethernet or RS232 is possible.

In addition, communication modules are available for connection to other bus systems or the shared interface with RFID readers.

Further information is included in Chapter 6 "Communication modules".



© Siemens AG 2013

Technical specifications

Order No.	6GF3 440-1CD10	6GF3 440-1GE10	6GF3 440-1LE10
Product-type designation	**Code reader MV440 SR**	**MV440 HR code reader**	**Code reader MV440 UR**
Suitability for installation	1D codes: Int. 2/5, Code 128, Code 93, Code 39, Code 32, EAN 13, EAN 8, UPC-A, UPC-E, GS1, Pharmacode, Postnet 2D codes: DMC, PDF417 (without: Truncated, Micro and Macro), QR (without: Micro and Macro), Vericode Text recognition: OCR-A, Semifont M13, similar fonts Code verification: AIM DPM-1-2006, Siemens DPM, ISO/IEC 15415, AS9132 Rev. A, ISO/IEC 16416	1D codes: Int. 2/5, Code 128, Code 93, Code 39, Code 32, EAN 13, EAN 8, UPC-A, UPC-E, GS1, Pharmacode, Postnet 2D codes: DMC, PDF417 (without: Truncated, Micro and Macro), QR (without: Micro and Macro), Vericode Text recognition: OCR-A, Semifont M13, similar fonts Code verification: AIM DPM-1-2006, Siemens DPM, ISO/IEC 15415, AS9132 Rev. A, ISO/IEC 16416	1D codes: Int. 2/5, Code 128, Code 93, Code 39, Code 32, EAN 13, EAN 8, UPC-A, UPC-E, GS1, Pharmacode, Postnet 2D codes: DMC, PDF417 (without: Truncated, Micro and Macro), QR (without: Micro and Macro), Vericode Text recognition: OCR-A, Semifont M13, similar fonts Code verification: AIM DPM-1-2006, Siemens DPM, ISO/IEC 15415, AS9132 Rev. A, ISO/IEC 16416
Interfaces			
Design of the electrical connection the Industrial Ethernet Interface	M12, d-coded, PoE	M12, d-coded, PoE	M12, d-coded, PoE
Design of the electrical connection of the PROFIBUS interface	-	-	-
Design of electrical connection of RS 422 interface	M12, 8-pin	M12, 8-pin	M12, 8-pin
Design of electrical connection of RS 232 interface	M16, 12-pin	M16, 12-pin	M16, 12-pin
Design of electrical connection for supply voltage	M16, 12-pin	M16, 12-pin	M16, 12-pin
Design of electrical connection at the digital inputs/outputs	M16, 12-pin	M16, 12-pin	M16, 12-pin
Number of digital inputs	5	5	5
Number of digital outputs	5	5	5
Design of digital inputs	4 opto isolated inputs (NPN, PNP capability) optionally as output, one high-speed trigger input	4 opto isolated inputs (NPN, PNP capability) optionally as output, one high-speed trigger input	4 opto isolated inputs (NPN, PNP capability) optionally as output, one high-speed trigger input
Design of digital outputs	4 isolated outputs optionally as input, short-circuit-proof, max. 50 mA, 1 high-speed trigger input for external lighting	4 isolated outputs optionally as input, short-circuit-proof, max. 50 mA, 1 high-speed trigger input for external lighting	4 isolated outputs optionally as input, short-circuit-proof, max. 50 mA, 1 high-speed trigger input for external lighting
Optical data			
Design of image sensor of camera	CCD chip 1/3", 640 x 480	CCD chip 1/3", 1024 x 769	CCD chip 1/1.8", 1600 x 1200
Type of image capture	Global shutter with manual or automatic exposure time	Global shutter with manual or automatic exposure time	Global shutter with manual or automatic exposure time
Range	0.07 … 3 m	0.07 … 3 m	0.07 … 3 m
Range note	Using C-mount lenses and lens accessories, the range can be exactly matched to the application	Using C-mount lenses and lens accessories, the range can be exactly matched to the application	Using C-mount lenses and lens accessories, the range can be exactly matched to the application
Mounting type of lens	C mount lens connection with Plexiglas lens protection, 65 mm diameter	C mount lens connection with Plexiglas lens protection, 65 mm diameter	C mount lens connection with Plexiglas lens protection, 65 mm diameter
Nature of fluorescent material	Integrated lighting or external lighting according to accessories list	Integrated lighting or external lighting according to accessories list	Integrated lighting or external lighting according to accessories list
Image acquisition frequency, maximum	80 Hz	30 Hz	25 Hz
Code reading rate, maximum	80 1/s	30 1/s	25 1/s
Type of focusing	Manual adjustment on the lens	Manual adjustment on the lens	Manual adjustment on the lens
Supply voltage, current consumption, power loss			
Supply voltage for DC, rated value	24 V	24 V	24 V
Supply voltage			
• for DC	19.2 … 28.8 V	19.2 … 28.8 V	19.2 … 28.8 V
Consumed current at 24 V DC			
• typical	0.27 A	0.27 A	0.27 A
• maximum	2 A	2 A	2 A
Stored energy time supply voltage failure, minimum	0.01 s	0.01 s	0.01 s
Mechanical data			
Material	Die-cast aluminum	Die-cast aluminum	Die-cast aluminum
Color	Petrol blue	Petrol blue	Petrol blue

© Siemens AG 2013

Order No.	6GF3 440-1CD10	6GF3 440-1GE10	6GF3 440-1LE10
Product-type designation	**Code reader MV440 SR**	**MV440 HR code reader**	**Code reader MV440 UR**
Permitted ambient conditions			
Ambient temperature			
• during operating	0 … 50 °C	0 … 50 °C	0 … 50 °C
• during storage	-30 … +70 °C	-30 … +70 °C	-30 … +70 °C
• during transport	-30 … +70 °C	-30 … +70 °C	-30 … +70 °C
Relative humidity at 25 °C without condensation during operating, maximum	95 %	95 %	95 %
Protection class IP	IP67	IP67	IP67
Resistance against shock	According to IEC 60068-2	According to IEC 60068-2	According to IEC 60068-2
Resistance against shock	100 m/s^2	100 m/s^2	100 m/s^2
Resistance against vibration	10 m/s^2	10 m/s^2	10 m/s^2
Design, dimensions and weight			
Width	68 mm	68 mm	68 mm
Height	122 mm	122 mm	122 mm
Depth	45 mm	45 mm	45 mm
Net weight	0.55 kg	0.55 kg	0.55 kg
Type of mounting	4 x M4 screws	4 x M4 screws	4 x M4 screws
Product properties, functions, components general			
Product feature silicon-free	Yes	Yes	Yes
Type of display	5 LEDs	5 LEDs	5 LEDs
Standards, specifications, approvals			
Verification of suitability	CE, KCC, F&B suitable, UL	CE, KCC, F&B suitable, UL	CE, KCC, F&B suitable, UL
Accessories			
Accessories	Licenses (verification and text recognition and object recognition), mounting brackets, built-in ring lights, external ring lights, C-mount lenses, protective barrels for lenses	Licenses (verification and text recognition and object recognition), mounting brackets, built-in ring lights, external ring lights, C-mount lenses, protective barrels for lenses	Licenses (verification and text recognition and object recognition), mounting brackets, built-in ring lights, external ring lights, C-mount lenses, protective barrels for lenses

© Siemens AG 2013

Selection and ordering data

	Order No.
SIMATIC MV440 SR For one-dimensional and two-dimensional codes. Optional: Text recognition (OCR), object recognition and verification of barcodes and data matrix codes. Variable image field and distance. Resolution: 640 x 480 pixels. PoE; IP67 using protective barrel for lens and sealing caps, otherwise IP40; package comprises reader, CD and plastic protective barrel for lens.	**6GF3440-1CD10**
SIMATIC MV440 HR For one-dimensional and two-dimensional codes. Optional: Text recognition (OCR), object recognition and verification of barcodes and data matrix codes. Variable image field and distance. Resolution: 1024 x 768 pixels. PoE; IP67 using protective barrel for lens and sealing caps, otherwise IP40; package comprises reader, CD and plastic protective barrel for lens.	**6GF3440-1GE10**
SIMATIC MV440 UR For one-dimensional and two-dimensional codes. Optional: Text recognition (OCR), object recognition and verification of barcodes and data matrix codes. Variable image field and distance. Resolution: 1600 x 1200 pixels PoE; IP67 using protective barrel for lens and sealing caps, otherwise IP40; package comprises reader, CD and plastic protective barrel for lens.	**6GF3440-1LE10**
Optional software modules	
Text recognition module "Text-Genius" License for the module "Text-Genius", supplied on USB flash drive; executable on SIMATIC MV440 firmware V3.0 and higher (MV440 not included in the scope of supply). Description see page 5/45.	**6GF3400-0SL01**
Text recognition module "Text-Genius Plus" License for the module "Text-Genius Plus", supplied on USB flash drive; executable on SIMATIC MV440 firmware V5.0 and higher (MV440 not included in the scope of supply). Description see page 5/45.	**6GF3400-1SL01**
Verification module "Veri-Genius" License for the module "Veri-Genius", supplied on USB flash drive; executable on SIMATIC MV440 firmware V4.0 and higher (MV440 not included in the scope of supply). Description see page 5/40.	**6GF3400-0SL02**
Object recognition module "Pat-Genius" License for the module "Pat-Genius", supplied on USB flash drive; executable on SIMATIC MV440 firmware V6.0 and higher (MV440 not included in the scope of supply). Description see page 5/49.	**6GF3400-0SL03**

	Order No.
Accessories	
Lens accessories Mini lenses with fixed focal length, adjustable aperture and focus (see also "Lenses" section on page 5/30).	
• Mini lens 6 mm, 1: 1,4 D = 32 mm, L = 37.5 mm	**6GF9001-1BB01**
• Mini lens 8.5 mm, 1:1.5 D = 42 mm, L = 47 mm, not suitable in combination with built-in ring lights	**6GF9001-1BE01**
• Mini lens 12 mm, 1:1.4 D = 29.5 mm, L = 35.7 mm	**6GF9001-1BL01**
• Mini lens 16 mm, 1:1.4 D = 29.5 mm, L = 37.2 mm	**6GF9001-1BF01**
• Mini lens 25 mm, 1:1.4 D = 29.5 mm, L = 38.9 mm	**6GF9001-1BG01**
• Mini lens 35 mm, 1:1.6 D = 29.5 mm, L = 41.4 mm	**6GF9001-1BH01**
• Mini lens 50 mm, 1:2.8 D = 29.5 mm, L = 38 mm	**6GF9001-1BJ01**
• Mini lens 75 mm, 1:2.8 D = 34 mm, L = 63.6 mm, an extension piece is required when using the D65 lens protective barrel (on request)	**6GF9001-1BK01**
Accessories for utilizing mini lenses at close range	
Set of intermediate rings with 0.5 mm, 1.0 mm, 5.0 mm, 10.0 mm, 20.0 mm and 40 mm rings with 31 mm diameter C thread, to be screwed in between the lens and the camera body for image capture in the macro range.	**6GF9001-1BU**
Set of intermediate rings with 0.5 mm and 2 x 1.0 mm rings with 31 mm diameter C thread, to be screwed in between the lens and the camera body for image capture in the close range.	**6GF9001-1BU01**

5

© Siemens AG 2013

	Order No.
Protective barrels for lenses	
Protective barrel for lens D65 made of metal, for built-in ring lights, internal diameter 57 mm, max. lens length 57 mm, IP67 degree of protection.	
• Glass front pane	**6GF3440-8AC11**
• Plastic front pane	**6GF3440-8AC21**
Protective barrel for lens D65 made of plastic; to achieve IP67 degree of protection; suitable for all variants of MV440 and for use with built-in ring lights; max. internal diameter 55 mm, max. lens length 48 mm.	**6GF3440-8AC12**
Built-in ring lights	
• **Built-in ring light, red** Light source: LED red (630 nm) Flash duration 20 µs to 10 ms, range of illumination 800 mm, mounting materials included, IP67 degree of protection when using protective barrel for lens.	**6GF3440-8DA11**
• **Built-in white ring light** Light source: White LED (440 nm to 650 nm) Flash duration 20 µs to 10 ms, range of illumination 800 mm, mounting materials included, IP67 degree of protection when using protective barrel for lens.	**6GF3440-8DA21**
• **Built-in ring light, green** Light source: Green LED (500 nm to 570 nm) Flash duration 20 µs to 10 ms, range of illumination 800 mm, mounting materials included, IP67 degree of protection when using protective barrel for lens.	**6GF3440-8DA31**
• **Built-in ring lamp, infrared** Light source: Infrared LED (850 nm to 880 nm) Flash duration 20 µs to 10 ms, range of illumination 800 mm, mounting materials included, IP67 degree of protection when using protective barrel for lens.	**6GF3440-8DA41**

	Order No.
External ring lights	
SIMATIC MV400 ring light	
• **Ring light, metal, infrared, clear** light source LED infrared, light source 850 nm, light source 500 mm to 23 m, suitable for D65 lens protective barrel, supply voltage: 24 V (18 V ... 30 V), dimensions B x H x T (mm): 142 x 142 x 42.4, degree of protection IP67.	**6GF3400-0LT01-7BA1**
• **Ring light, metal, red, clear** light source LED infrared, light source 500 mm to 3 000 mm, suitable for D65 lens protective barrel, supply voltage: 24 V (18 V ... 30 V) dimensions W x H x D (mm) 142 x 142 x 42.4, degree of protection IP67.	**6GF3400-0LT01-8BA1**
Cable	
IE connecting cable M12-180/IE FC RJ45 plug-145 for commissioning, service and installation Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with M12 plug (D-coded) and IE FC RJ45 plug, IP65/IP67 degree of protection. Length: 2 m	**6XV1871-5TH20**
IE M12-180/M12-180 connecting cable Pre-assembled IE FC TP trailing cable GP 2 x 2 (PROFINET type C) with two 4-pin M12 connectors (D-coded) up to max. 85 m, IP65/IP67 degree of protection, RJ45 assembly possible with plug-in connector 6GK1901-1BB10-2AA0 (see below). Lengths:	
0.3 m	**6XV1870-8AE30**
0.5 m	**6XV1870-8AE50**
1 m	**6XV1870-8AH10**
1.5 m	**6XV1870-8AH15**
2 m	**6XV1870-8AH20**
3 m	**6XV1870-8AH30**
5 m	**6XV1870-8AH50**
10 m	**6XV1870-8AN10**
15 m	**6XV1870-8AN15**

© Siemens AG 2013

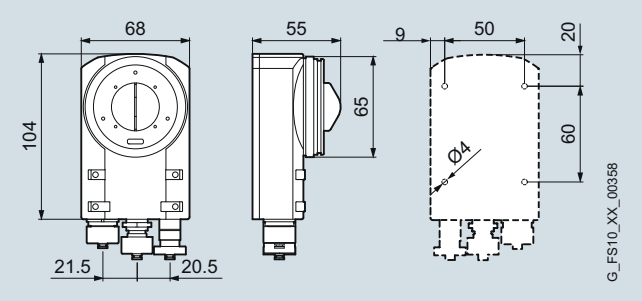
SIMATIC MV440

	Order No.
Industrial Ethernet FastConnect plug connector, 2x2, 180° cable outlet RJ45 plug connector (10/100 Mbit/s) with rugged metal enclosure and FastConnect connection method. For Industrial Ethernet FastConnect cable 2x2. For further cables, see Catalog IK PI under "Passive network components".	**6GK1901-1BB10-2AA0**
Cable for communication module interface Communication module cable for connection to communication modules, e.g. ASM 456, RF160C, RF170C, RF180C, and RF182C. Plug-in cable pre-assembled for SIMATIC MV440. Available in the following lengths:	
2 m	**6GT2891-4FH20**
5 m	**6GT2891-4FH50**
10 m	**6GT2891-4FN10**
20 m	**6GT2891-4FN20**
50 m	**6GT2891-4FN50**
Cable 24 V power supply Power cable, M16 pre-assembled, push-pull. Various lengths:	
1.5 m	**6GF3400-0BH15**
2 m	**6GF3400-1BH20**
Cable power supply DIO RS232 Power IO RS232 cable, M16 pre-assembled at one end, other end unconnected. Various lengths:	
10 m	**6GF3440-8BA2**
30 m	**6GF3440-8BA4**
Cable for external ring lights suitable for 6GF3400-0LT0-7DA1, 6GF3400-0LT0-8DA1, M12, open end, 4-pole, not suitable for drag cables, cable connects external ring lights with the control cabinet (24 V, Gnd, strobe), length 10 m.	**6GF3440-8BC4**
Adapter cable for external ring lights Suitable for 6GF3400-0LT0-7DA1, 6GF3400-0LT0-8DA1 enables direct connection of external ring lights to MV420 and MV440 when using the power supply cable DIO-RS232 (see above) M16, 12-pole socket; M16, 12-pole connector; M12, 4-pole socket, length 25 cm.	**6GF3440-8BD1**

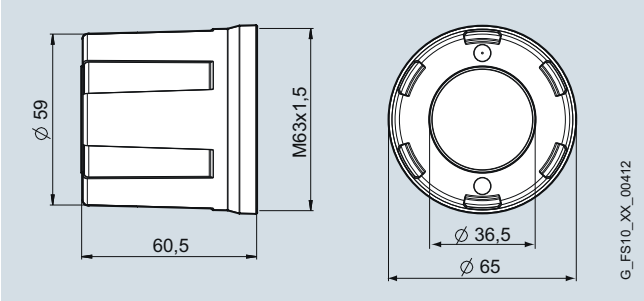
	Order No.
Mounting accessories	
Reader mounting plate Dimensions W x H x D (mm) 80 x 80 x 60, plate thickness: 4 mm	**6GF3440-8CA**
Mounting plate for external ring lights Dimensions W x H x D (mm) 96 x 76 x 46, plate thickness: 4 mm.	**6GF3440-8CD01**
Support system, tri-plate Dimensions W x H x D (mm) 80 x 80 x 60, plate thickness: 4 mm	**6GF9002-7AD**
Further accessories	
SCALANCE X108PoE Industrial Ethernet Switch Industrial Ethernet Switch for 10/100 Mbit/s, including operating instructions, Industrial Ethernet network manual and configuration software on CD-ROM; 6 x 10/100 Mbit/s RJ45 ports, electrical 2 x 10/100 Mbit/s RJ45 PoE ports, electrical. For more information about SCALANCE switches for PoE see Catalog IK PI.	**6GK5108-0PA00-2AA3**

© Siemens AG 2013

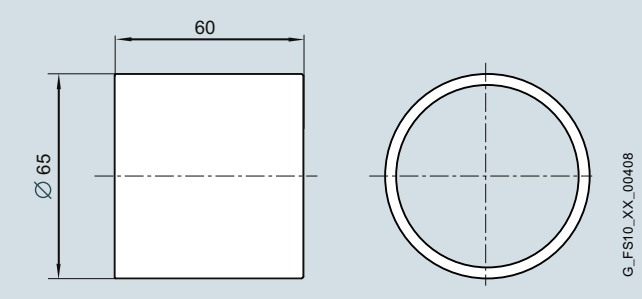
Dimensional drawings



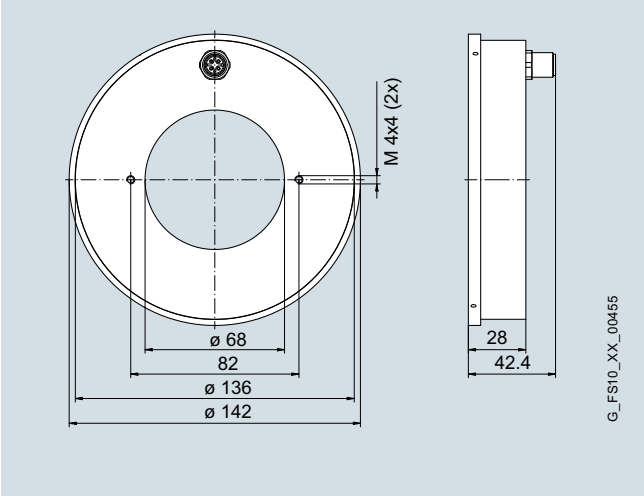
Stationary SIMATIC MV440 code reading system



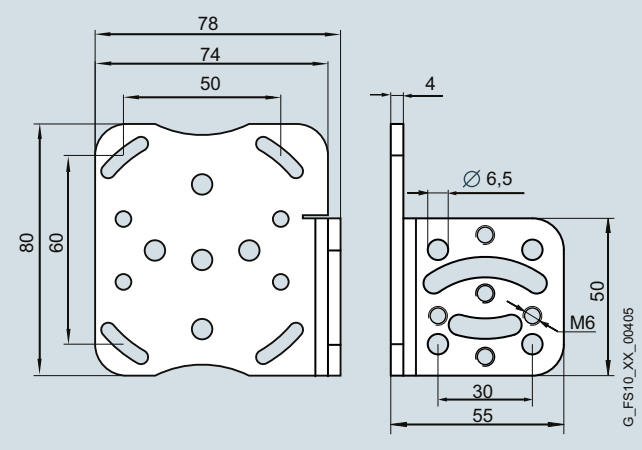
Plexiglas protective barrel



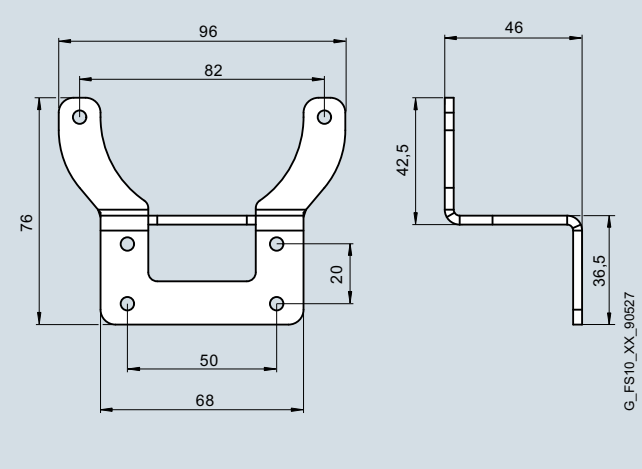
Protective barrel for lens D65



MV400 ring light



Mounting bracket for code reading system SIMATIC MV440



Mounting plate for external ring light

5

© Siemens AG 2013

Lenses

Overview

With a lens suitable for the respective image evaluation task, the size of the image field is determined for the camera image for the required operating distance.

High light intensity and the geometry of the image are extremely important for image evaluation (code reading, form recognition and position detection) High light intensity permits short shutter speeds and consequently a reduction of the blurring due to motion as well as maximizing the range.

Fault-free image geometry optimizes the fault tolerance of image analysis with regard to perspective and unevenness of the surface of the depicted object.

Lenses with fixed focal length and a settable aperture and focus are ideal for this purpose and are therefore preferred.

Application

Code and text recognition

The algorithms of code and text recognition tolerate variations in form and size of the marking. In many applications, code readers must tolerate the influence of perspective distortion. Geometric errors resulting from the imaging often reduce the reading performance of the overall system.

Important selection criteria for the lenses of code readers are fast shutter speeds which guard against blurring due to motion, as well as maximization of the reading distance.

All lenses in this accessories list meet the requirements for code reading and text recognition. In addition, lens accessories (e.g. filters) are available which in conjunction with the accessories of the readers support project-specific configurations.

Form recognition and position location

For form recognition with high reproducibility, is a format-filling high-resolution image is required. Geometric errors resulting from the imaging often reduce the reading performance of the overall system.

Important selection criteria for the lenses of code readers are a fast shutter speed which guards against blurring due to motion, as well as maximization of the range. It is particularly important to maximize the range, since the stability of image analysis rises as the angle of the image field reduces. This is why a large distance from the test object is advantageous.

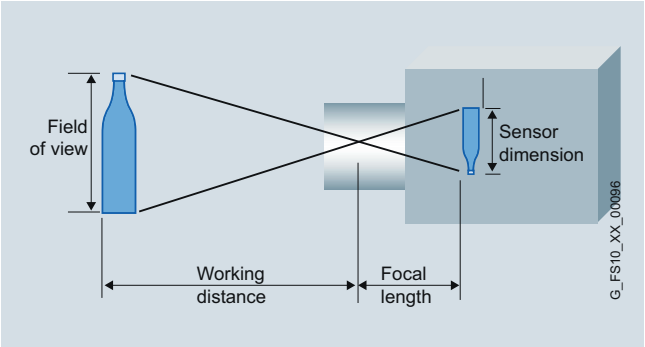
All lenses in this accessories list meet the requirements for shape recognition. In addition, lens accessories (e.g. filters) are available that in conjunction with the accessories of the readers support project-specific configurations.

Function

Image types

The optical path of the lens is defined by its construction.

For **spherical lenses** the solid angle depends on the focal length, focus adjustment and aperture; all rays run through the focal point of the lens (central projection). Objects that are further away from the lens are depicted smaller; objects that are closer to the lens are depicted larger:



The required image field size (height and width of the image), the size of the sensor chip and the focal length of the lens determine the operating distance:

d = (f x IS) / b

d = Operating distance (i.e. distance from lens to test object) in mm

f = Focal length of the lens in mm

IS = Size of image in the plane of the test object in mm

b = effective dimensions of the sensor in mm

In the case of lenses used in image processing systems, the focal length is fixed, the aperture and focus settings can be fixed. The focal length, the maximum focal aperture and the focusing range are normally specified on the lenses.

Focal distance

The focal length makes a statement about the angle of the image field or magnification of the lens.

The focal length of the lens is determined by the size of the required image field and the size of the camera chip when a specific distance has to be maintained. The most common chip sizes in cameras today are ½", 1/3" and ¼". If the distance to the object lies below the adjustable focusing range of the lens, i.e. at close range, the focus can be adjusted using intermediate rings.

If the back focal length for this camera is dimensioned for CS-Mount lenses, as for VS 130-2, a C-Mount lens can also be focused if a 5 mm extension tube is used.

Aperture

Reduction of the light intensity by interrupting the optical path.

Focus

Setting the focus of the lens to a specific distance.

Depth of field

Depth of field is the area within which (in front of and behind the object) that is displayed with sufficient sharpness of focus. The larger the aperture (the smaller the aperture number), the smaller the depth of field.

Lenses with a larger focal length have a smaller depth of field, the effect is considerable for images at close range.

© Siemens AG 2013

Lens types

Lenses with smaller focal length are called wide-angle lenses, they can also be used at short operating distances, but produce intense distortion of the image. At a suitable distance, they have a large image field.

Lenses with a long focal length are called telephoto lenses; they have a large magnification but cannot be focused at close range, so macro lenses are used that can be focused by means of large telescopic extensions or intermediate rings. At a suitable distance, they have a small image field.

In the case of telecentric lenses, at least the optical path at the object end is almost parallel (i.e. parallel projection). This means that objects at different distances are depicted in the same size. Objects can, however, only be displayed that are smaller than the diameter of the lens. It is not possible to adjust the range of focus with these lenses.

The optical characteristics can be restricted by means of optical filter glasses to counteract distortion in the image. Colored filters limit the spectral range, gray filters limit the light intensity and polarization filters restrict the transmission plane. Filters of this type can be attached either by using the internal thread or the flange on the front of the lens. The holder for the filter glass is designed to fit the lens.

Selection and ordering data

	Order No.
Lenses for SIMATIC MV440 and VS130-2, for reading code and plain text and for object recognition	
with fixed focal length, adjustable aperture and focus, with locking screw.	
• **Mini lens 6 mm, 1:1.4** D = 32 mm, L = 37.5 mm; MOD = 0.1 mm[1)]	**6GF9001-1BB01**
• **Mini lens 8.5 mm, 1:1.5** D = 42 mm, L = 47 mm; successor type for 6GF9001-1BE; MOD = 0.2 m[1)]	**6GF9001-1BE01**
• **Mini lens 12 mm, 1:1.4** D = 29.5 mm, L = 35.7 mm; MOD = 0.25 m[1)]	**6GF9001-1BL01**
• **Mini lens 16 mm, 1:1.4** D = 29.5 mm, L = 37.2 mm; successor type for 6GF9001-1BF; MOD = 0.25 m[1)]	**6GF9001-1BF01**
• **Mini lens 25 mm, 1:1.4** D = 29.5 mm, L = 38.9 mm; successor type for 6GF9001-1BG; MOD = 0.25 m[1)]	**6GF9001-1BG01**
• **Mini lens 35 mm, 1:1.6** D = 29.5 mm, L = 41.4 mm; MOD = 0.4 m[1)]	**6GF9001-1BH01**
• **Mini lens 50 mm, 1:2.8** D = 29.5 mm, L = 38.0 mm; successor type for 6GF9001-1AH; MOD = 0.9 m[1)]	**6GF9001-1BJ01**
• **Mini lens 75 mm, 1:2.8** D = 34.0 mm, L = 63.6 mm; MOD = 0.7 m[1)] Not for use in combination with internal ring lights.	**6GF9001-1BK01**
CS-Mount for C-Mount adapter ring 5 mm	**6GF9001-1AP02**
Accessories for utilizing mini lenses at close range	
Set of intermediate rings with 0.5 mm, 1.0 mm, 5.0 mm, 10.0 mm, 20.0 mm and 40 mm rings with 31 mm diameter C thread, to be screwed in between the lens and the camera body for image capture in the macro range.	**6GF9001-1BU**
Set of intermediate rings with 0.5 mm and 2 x 1.0 mm rings with 31 mm diameter C thread, to be screwed in between the lens and the camera body for image capture in the close range.	**6GF9001-1BU01**
Accessories for utilizing mini lenses in the telephoto range	
Focal length doubler D = 30.5 mm, L = 17.9 mm, with C-thread to be screwed in between the lens and camera to extend the focal length by a factor of 2. Suitable lenses: 6GF9001-1BE01, …-1BL01, …-1BF01, …-1BG01, …-1BH01, …-1BJ01, …-1BK01	**6GF9001-1BV**
Filter for utilizing the mini lenses in the limited field of view	
Infrared filter Function: Visible light is largely or completely filtered out, infrared light can pass through. Application: When used with infrared lamps, it is possible to achieve independence from daylight. Suitable lenses: 6GF9001-1BL01, …-1BF01, …-1BG01, …-1BH01, …-1BJ01	**6GF9001-2AD**
Blue filter Function: Blue light can pass through. Application: e.g. to improve the visualization of structures. Suitable lenses: 6GF9001-1BL01, …-1BF01, …-1BG01, …-1BH01, …-1BJ01	**6GF9001-2AE**
Polarization filter Function: Filters out light which is directed at right angles to the polarization direction of the filter. Application: e.g. to reduce reflections from metal. Suitable lenses: 6GF9001-1BL01, …-1BF01, …-1BG01, …-1BH01, …-1BJ01	**6GF9001-2AF**
Daylight filter Function: Visible light can pass largely undiminished, and frequencies above and below (infrared light and ultraviolet light) are filtered out. Application: The filter is used to protect the image sensor in the camera from laser light to the extent that this is outside the visible spectrum. Suitable lenses: 6GF9001-1BL01, …-1BF01, …-1BG01, …-1BH01, …-1BJ01	**6GF3440-8EA1**

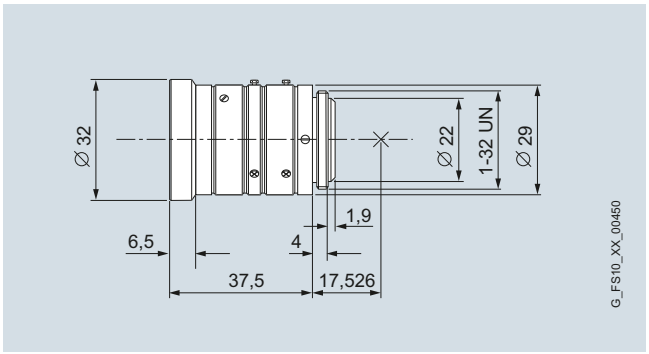
[1)] MOD = Minimum object distance

© Siemens AG 2013

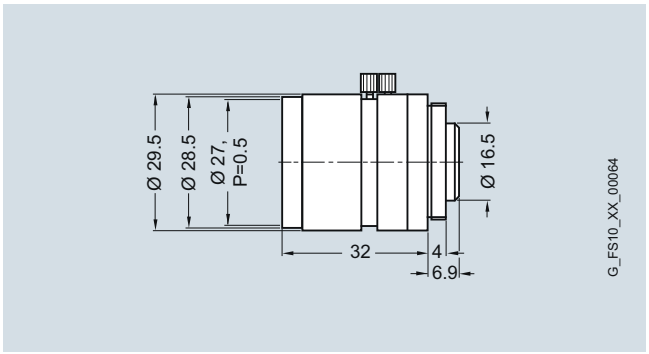
Lenses

Dimensional drawings

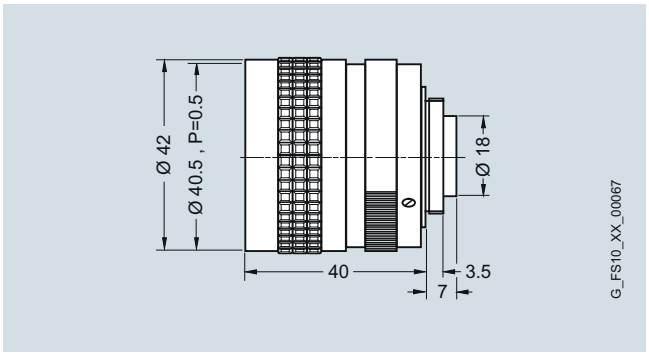
Lenses for reading code and plain text and parts recognition



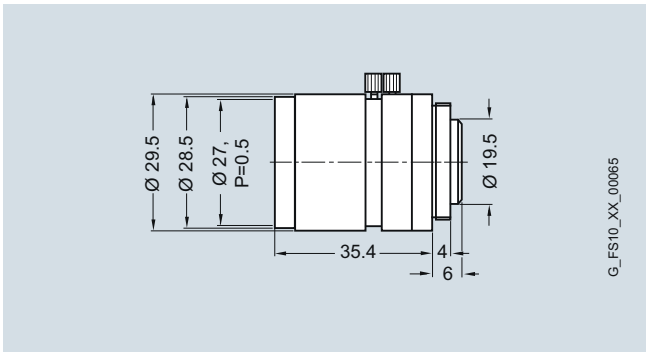
Lens 6GF9 001-1BB01



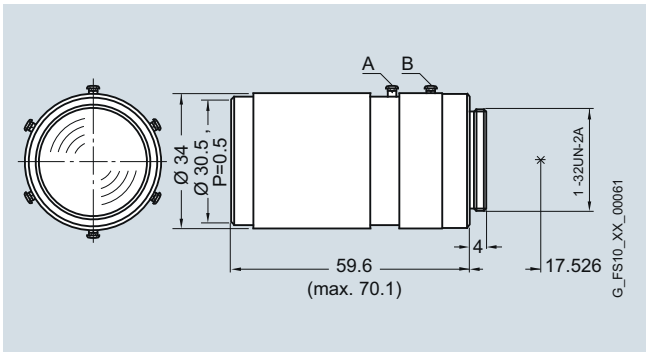
Lens 6GF9 001-1BG01



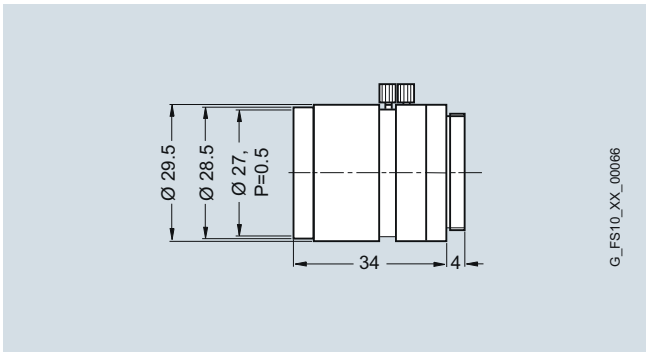
Lens 6GF9 001-1BE01



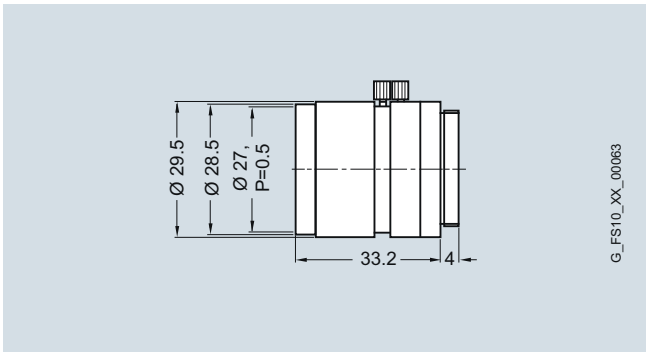
Lens 6GF9 001-1BH01



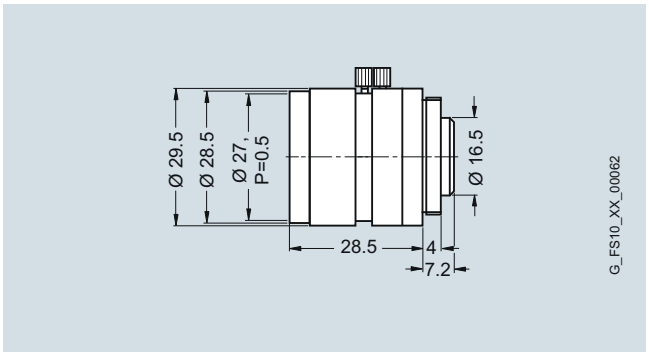
Lens 6GF9 001-1BK01



Lens 6GF9 001-1BJ01



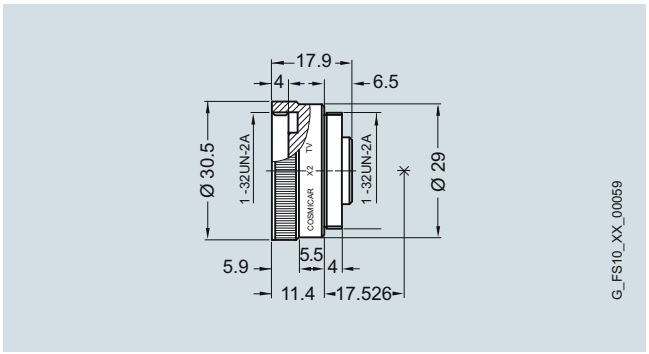
Lens 6GF9 001-1BF01



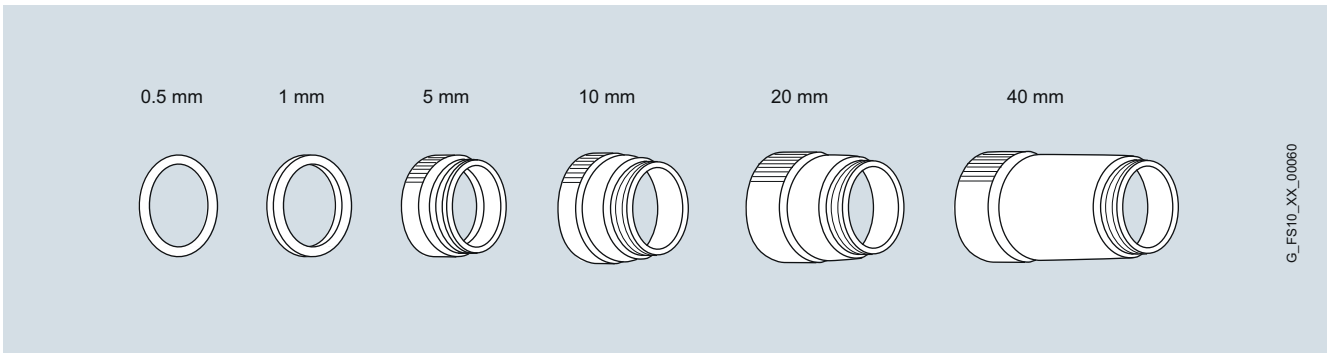
Lens 6GF9 001-1BL01

© Siemens AG 2013

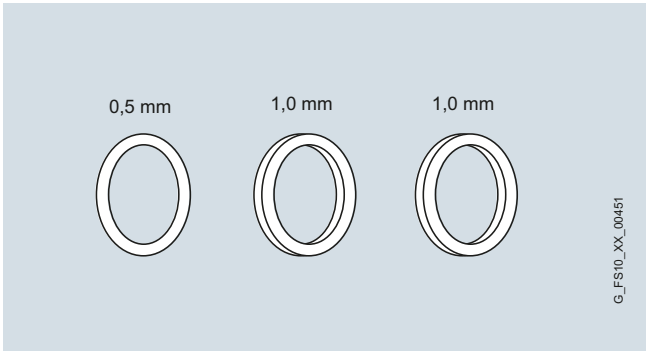
Accessories for lenses



Focal range doubler 6GF9 001-1BV



Intermediate ring set 6GF9 001-1BU



Intermediate ring set 6GF9 001-1BU01

5

© Siemens AG 2013

Introduction

Overview

SIMATIC MV320 handheld reading system

SIMATIC MV325 handheld reading system

SIMATIC MV340 handheld reading system

Handheld reading systems are suitable for portable reading of two-dimensional (2D) data matrix codes and one-dimensional (1D) barcodes. The integrated complex image processing functions and illumination technologies permit codes to be read on different surfaces. Code readers of different performance classes are available for this purpose. The range extends from devices for simple reading tasks such as printed barcodes up to models for demanding, weak-contrast markings such as dot-peened or lasered codes.

SIMATIC MV320

The SIMATIC MV320 is the entry level device. The entry level device is suitable for labels with higher contrasts, but it can also be used application-specifically for labels with lower contrasts. The SIMATIC MV320 is available as cabled versions (RS232, USB). The reader is designed for a distance of up to 375 mm.

SIMATIC MV325

The SIMATIC MV325 handheld readers are powerful readers with Bluetooth wireless communication. The readers are suitable for labels with higher contrasts, but they can also be used application-specifically for labels with lower contrasts. The SIMATIC MV325 readers are supplied with a charging station containing the respective access point of the wireless interface and a cabled connection to the host (USB). The readers are designed for a distance of up to 375 mm.

SIMATIC MV340

The SIMATIC MV340 is the most powerful device and is particularly suitable for demanding applications such as low-contrast and damaged codes. It has a high reading rate when decoding data matrix symbols. The special integrated lighting works equally well on smooth, reflective or wavy surfaces. The MV340 can be connected via RS232 or USB. The device is designed for close ranges and records codes at a distance of up to 50 mm.

© Siemens AG 2013

Major differences

Type	SIMATIC MV320	SIMATIC MV325	SIMATIC MV340
Graphic display	–	–	–
Read quality of low-contrast codes	+	+	+++
Operating distance			
• Minimum (code-dependent)	50 mm (1.9")	50 mm (1.9")	0 mm (0.0")
• Maximum (code-dependent)	375 mm (14.8")	375 mm (14.8")	50 mm (2.0")
Field of view			
• Near	25 mm x 15 mm (0.98"x 0.6") at 50 mm (1.9") distance	25 mm x 15 mm (0.98"x 0.6") at 50 mm (1.9") distance	36 mm x 29 mm (1.4" x 1.1") at distance of 0 mm (0.0")
• Distant	150 mm x 90 mm (5.9" x 3.5") at 50 mm (1.9") distance	150 mm x 90 mm (5.9" x 3.5") at 375 mm (14.8") distance	71 mm x 57 mm (2.8" x 2.2") at distance of 51 mm (2.0")
Decoding capability	1D: Codabar, Code 11, Code 32, Code 39, Code 93, Code 128, Interleaved 2 of 5, GS1 DataBar (RSS), Maxtrix 2 of 5, MSI Plessey, Plessey, Straight 2 of 5, Trioptic, UPC/EAN/JAN Stacked 1D: GS1 Composite (CC-A/CC-B/CC-C), MicroPDF, PDF417 2D: Aztec Code, Data Matrix, Micro QR Code, QR Code, Han Xin	1D: Codabar, Code 11, Code 32, Code 39, Code 93, Code 128, Interleaved 2 of 5, GS1 DataBar (RSS), Maxtrix 2 of 5, MSI Plessey, Plessey, Straight 2 of 5, Trioptic, UPC/EAN/JAN Stacked 1D: GS1 Composite (CC-A/CC-B/CC-C), MicroPDF, PDF417 2D: Aztec Code, Data Matrix, Micro QR Code, QR Code, Han Xin	1D: Code 39, Code 93, Code 128, I2of5, Codabar, UPC/EAN, Pharma-code, BC 412 2D: Data Matrix, QR Code, MicroQR Code, PDF417, GS1 Databar, Aztec
Department of Defense Unique Identifier String Validator	–	–	•
Code creation	Print, laser	Print, laser	Laser, print, dot peen
Radio interfaces	–	Bluetooth	–
Ports	USB, RS232	USB	USB, RS232

Benefits

get Designed for Industry

- Industry leading reading performance for Data Matrix codes, also for hard-to-read DPMs.
- Rugged design, for production environment.
- Supports multiple communication protocols: RS232 / USB or Bluetooth.
- Can read barcodes, data matrix codes, and other symbols.
- Can be used as a replacement device for existing barcode readers.

Application

The hand-held reader systems are suitable for optical identification of objects using 1D or 2D codes in the production, logistics, quality control, and maintenance and servicing fields. Application examples:

- Automotive industry
  - Markings on various drive components (cylinder heads, cylinder blocks, elbow joints, etc.)
  - Laser markings on various drive components (cam shafts, crankshafts, pistons, piston rods, gearbox components, etc.)
  - Laser markings on electronic components, PCBs or enclosures
- Mechanical engineering
  - Markings on different types of component
- Tobacco industry
  - Printed or laser markings on boxes
- Food industry
  - Printed or laser markings on cartons
  - Laser markings on production machines

Design

All handheld readers are equipped with a handle. The handles are equally suitable for right-handed or left-handed persons. The read process is triggered by a switch on the handle. The handle can be removed. On cabled connections via RS232 or USB, data and power are transmitted direct via the shared cable.

© Siemens AG 2013

SIMATIC MV320

Overview

SIMATIC MV320 is a rugged, powerful industrial barcode and data matrix reader suitable for high resolutions. The handheld reader reads two-dimensional (2D) data matrix codes and one-dimensional barcodes. It can read medium to high contrast data matrix codes. The cell size should be larger than 0.13 mm. Barcodes can be read if the width of a bar is larger than 0.12 mm.

The reader possesses complex image processing functions and illumination technology in order to read codes on many different surfaces.

The SIMATIC MV320 handheld reader is suitable for wired communication. Thanks to the varied interface technology (USB, RS232), simple integration into your application is possible with the device.

The SIMATIC MV320 handheld reader is supplied as a package including USB cable. A separate package comprising cable and power supply is available for use as an RS232 version.

Design

Rugged ergonomic handle with integral strain relief

The SIMATIC MV320 handheld reader has a monolithic product and thus extremely rugged. The only replaceable component is the cable that is connected to the reader with protected strain relief but can nevertheless be easily replaced for the purpose of changing the interface technology.

Integration

The SIMATIC MV320 handheld readers can communicate with the host computer by means of RS232 and USB. No special software is required for this purpose. The SIMATIC MV320 is configured by reading supplied data matrix codes.

The handheld reader can only be operated via RS232 and USB for direct transfer of the codes to the host computer. Batch mode is not possible.

Selection and ordering data

	Order No.
SIMATIC MV320	
Rugged industrial barcode and data matrix reader with 1.8 m USB cable	**6GF3320-0HT01**
Accessories	
USB cable	**6GF3320-0AC02**
1.8 m long, not spiraled	
RS232 cable	**6GF3320-0AC03**
2.4 m long, spiraled	
Power supply unit	
• For the USA	**6GF3020-0AC40-0AP1**
• For Europe	**6GF3020-0AC40-0AP2**
Metal stand	**6GF3320-0AC07**

5

© Siemens AG 2013

Overview

SIMATIC MV325 is a rugged, powerful industrial barcode and data matrix reader suitable for high resolutions. It reads two-dimensional (2D) data matrix codes and one-dimensional barcodes.

Medium to high contrast data matrix codes can be read. The cell size should be larger than 0.13 mm. Barcodes can be read if the width of a bar is larger than 0.12 mm.

The reader possesses complex image processing functions and illumination technology in order to read codes on many different surfaces.

The SIMATIC MV325 handheld reader is suitable for wireless communication. Thanks to Bluetooth interface technology, simple integration into your application is possible with the device.

The handheld reader is supplied as a package including charging station and USB cable.

Design

The SIMATIC MV325 handheld reader has a replaceable battery pack and is extremely rugged. The only replaceable component is the battery that can be charged together with the reader or individually in the charging station.

Integration

The charging station of the SIMATIC MV325 handheld reader can communicate with the host computer by means of USB. No special software is required for this purpose. The SIMATIC MV325 is configured by reading supplied data matrix codes.

The SIMATIC MV325 handheld reader itself communicates via Bluetooth with the base station. No special software is required for connecting a handheld reader with a specific charging station since the SIMATIC MV325 is connected with the charging station by reading a unique code on the charging station.

The code contents read are automatically transferred to the charging station as soon as a wireless connection is established. If the connection to the charging station is not established, the read results are buffered in the mobile section (if this function is activated). This operating mode is referred to as batch mode. As soon as the connection to the charging station is restored, the read results are automatically transferred.

Selection and ordering data

	Order No.
SIMATIC MV325 Rugged industrial 1D and 2D code reader (e.g. barcode and data matrix), with charging station and USB cable. With Bluetooth wireless interface and charging station with USB host interface	**6GF3325-0HT01**
Accessories	
Charging station Charging station with USB host interface and Bluetooth wireless interface. With USB cable (0.9 m).	**6GF3325-0AC03**
Battery Lithium ions (1300 mAh; 50,000 charging cycles)	**6GF3325-0AC07**

5

© Siemens AG 2013

SIMATIC MV340

Overview

SIMATIC MV340 is one of the most powerful handheld readers in the world and is thus particularly suitable for demanding applications. It reads a wide range of direct part markings (DPM), from linear barcodes up to 2D symbols. Different codes can be read without having to reconfigure the device.

The device is designed for close ranges and records codes at a distance of up to 50 mm. The optimum reading distance is 6 mm. The special integrated lighting is ideal for a wide variety of surfaces and increases the contrast with stamped codes. Reading despite fluctuating lighting conditions, low contrast, and twisted or damaged codes are the strengths of the MV340.

The MV340 is connected via a USB or RS232 interface to the IT system. The USB cable is included in the delivery as standard, the RS232 cable can be ordered separately as an accessory.

Design

The MV340 is a fully integrated device that combines a powerful reader unit and lighting in a rugged housing with an ergonomically shaped handle. The read process is triggered by a switch on the handle. Feedback from the read process can be optical via a multi-color LED, acoustic, or by means of a vibrating alarm.

The special integrated lighting unit can switch automatically between different lighting types to always provide optimal lighting conditions for a wide range of code and surface types. Even low-contrast codes or dot peen markings are therefore no longer a problem.

The device is supplied with a USB cable as standard. An RS232 cable can be ordered separately as an accessory.

Integration

The SIMATIC MV340 is connected via USB or RS232. Free ESP software is available for user-friendly set-up of the device. As an alternative, the device can be installed and operated without special software since it can also be configured by reading supplied data matrix codes.

The power supply is solely via cable. If the device is connected via USB to the host computer, the supply voltage is applied directly via the USB port. If the connection is via RS232, an additional power supply unit is required which is coupled to the RS232 connector via Y-cable. The power supply unit is available in three variants: EU, UK, and USA.

Technical specifications

Order No.	**6GF3 340-0HT01**
Product-type designation	**MV340 hand-held reader**
Suitability for installation	1D codes: Int. 2/5, Code 128, Code 93, Code 39, EAN/UPC, Codabar, BC 412, 2D codes: DMC, PDF417, QR, GS1 Databar
Design of the interface	USB, RS232
Optical data	
Design of image sensor of camera	CMOS 1280 x 1024
Range	0 … 50 mm
Range note	Code-dependent
Mounting type of lens	Integrated
Nature of fluorescent material	Lighting system comprising diffuse incident light (red, blue) and dark field (red)
Image acquisition frequency, maximum	10 Hz
Type of focusing	Fixed focus, optimum focal point at 6.3 mm
Supply voltage, current consumption, power loss	
Type of current supply	Via USB or external plug-type power supply unit (RS232), 5 V, 410 mA
Permitted ambient conditions	
Ambient temperature	
• during operating	0 … 50 °C
• during storage	-20 … +65 °C
Relative humidity at 25 °C without condensation during operating, maximum	95 %
Height of fall, maximum	1.8 m
Design, dimensions and weight	
Width	180 mm
Height	63 mm
Depth	114 mm
Net weight	0.2 kg
Product properties, functions, components general	
Design of the display	Multi-color LED
Design of the control elements	Trigger in handle
Product functions management, configuration	
Product function of the software	Read, display, save, transfer codes
Type of programming	Optical parameter assignment or with configuration software
Accessories	
Accessories	RS232 cable with power supply

© Siemens AG 2013

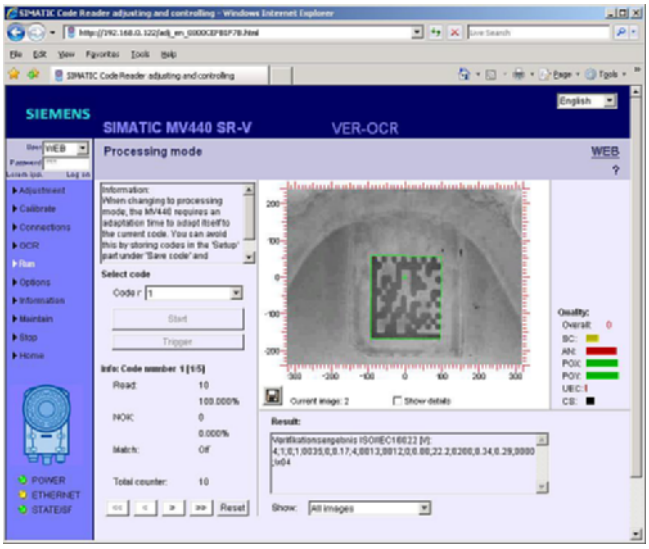
Selection and ordering data

	Order No.
SIMATIC MV340 Rugged industrial barcode and data matrix handheld reader with USB cable.	**6GF3340-0HT01**
Accessories	
RS232 cable	
• 2.4 m long, spiraled.	**6GF3020-0AC40-0AC1**
• 2.4 m long, spiraled, with power supply for USA.	**6GF3020-0AC40-0AC3**
• 2.4 m long, spiraled, with power supply for Europe.	**6GF3020-0AC40-0AC4**
• 2.4 m long, spiraled, with power supply for UK.	**6GF3020-0AC40-0AC5**
• 5 m long, spiraled.	**6GF3020-0AC40-0AC7**
• 5 m long, spiraled, with power supply for Europe.	**6GF3020-0AC40-0AC8**
USB cable 1.8 m long, not spiraled.	**6GF3020-0AC40-0AC0**
Power supplies	
• For USA.	**6GF3020-0AC40-0AP1**
• For Europe.	**6GF3020-0AC40-0AP2**

© Siemens AG 2013

Veri-Genius for MV440

Overview



Marking a product is normally done very early on in the production process so that all following steps can be controlled using the product identity.

By using verification systems, the readability of marks is guaranteed throughout the entire production process regardless of any possible contamination or when using different read devices. Moreover, the marking can continue to be read after the production process throughout the lifespan of the product.

With the verification license "Veri-Genius", devices of the SIMATIC MV440 family can be used for checking the marking quality of codes (verification) in addition to reading 1D barcodes and 2D matrix codes.

The license is supplied as a "Single License" on a USB flash drive and can be installed via the SIMATIC Automation License Manager (ALM) on any reader of the SIMATIC MV440 series. The license is executable on a SIMATIC MV440 as of firmware version 4.0.

Benefits

get Designed for Industry

Support for all important sectors and code types through the following verification standards:

- ISO TR 29158 (previously AIM DPM-1-2006)
  - Code type: Data Matrix Code
  - Type of marking: All - focus on DPM, e.g. dot-peened and lasered markings
  - Industries: All - focus on DPM, e.g. dot-peened and lasered markings
- Siemens DPM
  - Code type: Data Matrix Code
  - Type of marking: All - focus on DPM, e.g. dot-peened and lasered markings
  - Industries: All
- ISO/IEC 15415
  - Code type: Data Matrix Code
  - Type of marking: Printed
  - Sectors: All – focus: Pharmaceutical industry
- AS9132 Rev. A (previously IAQG)
  - Code type: Data Matrix Code
  - Type of marking: Printed
  - Sectors: All – focus: Aerospace
- ISO/IEC 15416 (previously ANSI X3.182-1990)
  - Code type: Barcode
  - Type of marking: Printed
  - Sectors: All - printed labels

Further highlights

- Different resolutions are available (640 x 480 pixels, 1024 x 768 pixels and 1600 x 1200 pixels)
- License includes calibration card
- Simultaneous reading and verifying in one image field
- Flexible retrofitting of the license to each device of the SIMATIC MV440 series via the Automation License Manager of SIMATIC – advantage: Savings in stocking of spare parts
- Simple integration of verification in the automation environment via SIMATIC MV440 using a function block (FB79 and FB45)

© Siemens AG 2013

Application

Applications for verification span across almost all sectors. To maximize read rates in production and logistics and to make them predictable, it is essential to measure the marking quality.

The following sectors and applications are a particular focus for MV440 verification systems:

Automobile industry

- Needle marking (DPM): e.g. cylinder heads, cylinder blocks, etc.
- Laser marking (DPM): Cylinder pistons, gearbox components, etc.
- Laser markings on electronic components, printed circuit boards, or enclosures

Pharmaceutical industry

- Print or laser markings on medicines (DPM, OCR)
- Aerospace industry
- Needle or laser markings on gas turbine blades (DPM)
- Needle or laser markings on jet engine components (DPM)

Medical equipment

- Laser markings on implants (DPM)
- Laser markings on medical devices (DPM).

Electronics

- Needle or laser markings on hard disk components
- Lasered or etched markings on hard disk components (DPM)

Semiconductors

- Laser markings on rigid and flexible circuit boards (DPM)
- Laser markings on enclosed semiconductor components, heat sinks or heat exchangers (DPM)

"Veri-Genius" can be used anywhere where environmental conditions permit the use of MV440 code readers - for details, see SIMATIC MV440. Standard ring lights and lenses are designed to achieve IP67 degree of protection by means of the protective barrel, and for glass-free use in the food and beverages industry. If light sources or lenses are used outside the protective barrel, they must be used in compliance with their specification.

Any host and HMI systems required must be selected sector-specifically and project-specifically. The range of application of the selected test method is defined in the specification of the test method and compliance is essential if universally valid results are to be obtained.

Design

All SIMATIC MV440 stationary code readers are basic units under the terms of the license. The verification functionality is enabled by transferring the license key from the USB flash drive on which it is supplied to the MV440 code reader by means of SIMATIC License Manager.

Verification with MV440 verification systems is suitable for both inline and offline measurements. In both cases, the specification of the verification standard used must be observed to ensure a robust measurement result. This means, for example, that the lighting and alignment of the light source, camera and test object must be in accordance with the definitions of the respective standard.

If only one light source is used, the MV440 can control an external light source using the existing image-synchronized digital output, or the external light source can be operated continuously.

If more lighting directions are required, an external controller can be used to activated the desired lighting and to start each individual measurement by means of triggering. The result from the quality measurement or the relevant partial measurement is output directly by the MV440 after completion of the measurement. In the case of more than one measurement, it is the task of the external controller to combine the partial results into an overall result and to visualization this.

If the test method requires calibration, the calibration card included in the scope of supply can be used in most cases. In cases with extreme imaging requirements (e.g. with very small or very large codes), the task of calibration must be resolved application-specifically.

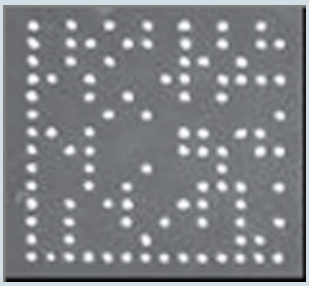
© Siemens AG 2013

Veri-Genius for MV440

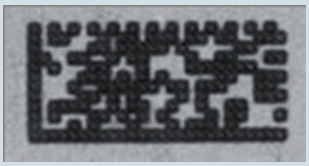
Function

Verification of code quality is an additional function subject to a license that can be activated on any SIMATIC MV440 by installing the "Veri-Genius license". The functionality is available without a license in demo mode.

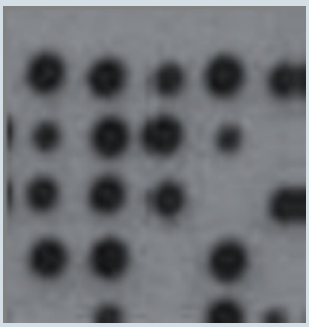
The following typical types of fault can be detected by measuring the marking quality - the following pictures show examples of correct code and faults in the marking quality:



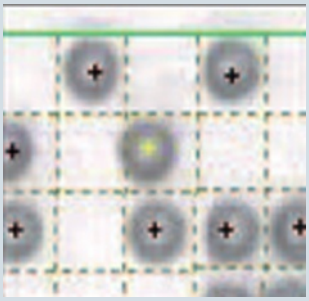
Correct code



Incorrect or non-uniform cell size in the marking



Incorrect or non-uniform cell size in the marking



Incorrect or non-uniform cell position in the marking

Incorrect overall geometry of the marking

Damaged surface of the marking or part

Very little or non-uniform contrast in the marking

Very little or non-uniform contrast in the marking

The following measuring procedures/standards are available for the purposes of inspection:

- ISO TR 29158 (previously AIM DPM-1-2006)
- Siemens DPM
- ISO/IEC 15415
- AS9132 Rev. A (previously IAQG)
- ISO/IEC 15416 (previously ANSI X3.182-1990)

5

© Siemens AG 2013

The measurement result is output as an overall result in 5 stages, which are named using letters or numbers:

Overall result as a digit	Overall result as letters	Overall result as text
4	A	Top quality
3	B	Good quality
2	C	Satisfactory quality
1	D	Adequate quality
	E	(not used)
0	Error	Marking quality inadequate

The components of a measurement result and calculation of the overall result are dependent on the test method used.

The overall result and the components of a measurement result can be output after a test, and are then available for further processing on an external system, e.g. for archiving or creating a test report.

© Siemens AG 2013

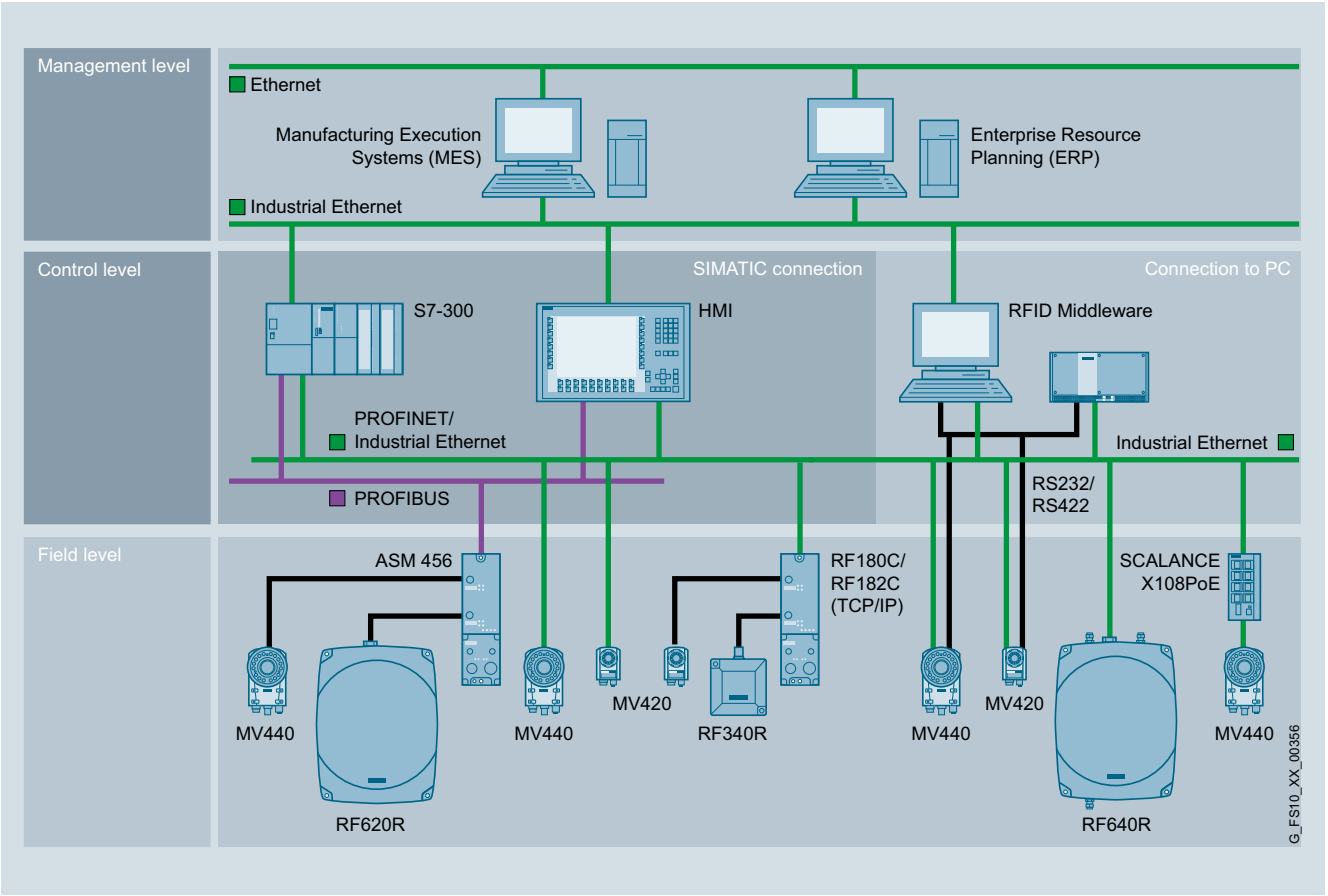
Veri-Genius for MV440

Integration

The MV440 verification systems can use all communication services that the basic units of the SIMATIC MV440 family offer:

Usable communication services	
PROFINET IO (FB79)	Onboard MV440 PROFINET interface.
PROFINET IO (FB101, Ident profile)	Onboard MV440 PROFINET interface.
PROFINET IO (FB45, FB101, Ident profile)	Via the MV440 ASM interface, using the communication module RF180C
PROFIBUS DP V0/1 (FB45, Ident profile)	Via MV440 ASM interface, using the ASM 456 communication module.
TCP/IP native	Onboard MV440 PROFINET interface.
RS-232 (ASCII)	Onboard MV440 RS232 interface.

The most important types of interface in the automation environment are shown in the overview below. For further details, refer to the section on SIMATIC MV440.



Selection and ordering data

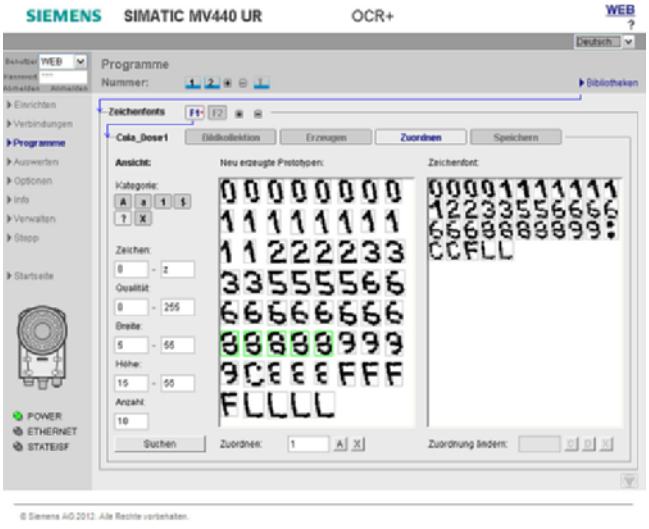
	Order No.
Verification module Veri-Genius	**6GF3400-0SL02**
Software license for verification of machine-readable 1D bar codes and Data Matrix Codes. The license is supplied on a USB flash drive; executable on all SIMATIC MV440 code reading systems as of firmware V4.0 (SIMATIC MV440 not included in the scope of delivery). The scope of supply includes the calibration card.	
Calibration card	**6GF3440-8CE**
Spare part	

© Siemens AG 2013

Overview

With the "Text-Genius" and "Text-Genius Plus" licenses, SIMATIC MV440 can be used for text recognition (in addition to reading 1D bar codes and 2D matrix codes). Text recognition is also referred to as OCR (Optical Character Recognition). Simultaneous reading and comparing of plain text and reading of machine-readable codes in the same image field is thus possible.

"Text-Genius" allows text recognition without training for a number of character sets by using generic algorithms, and thus reading without a preparatory phase.



Text-Genius Plus

The "Text-Genius Plus" license comprises all functions of the "Text-Genius" license and additionally enables training of further fonts and characters, including special characters and graphic symbols.

Licenses

The licenses are supplied as a "Single License" on a USB flash drive and can be copied to the device with the SIMATIC Automation License Manager (ALM) using a plug-in. The "Text-Genius" license is executable on a SIMATIC MV440 with firmware version 3.0 and higher, the "Text-Genius Plus" license with Firmware version 5.0 and higher.

Benefits

get Designed for Industry

Highlights of Text-Genius and Text-Genius Plus at a glance

- Fast and reliable reading of plain text (up to 1000 reads per minute) for high-speed applications.
- Fast and reliable checking of the readability of plain text (up to 1000 reads per minute) for high-speed applications.
- Flexible reading and swapping between different fonts (e.g. OCR A, OCR B) without complex learning using Polyfont character set.
- High reading rate and reliability through saving of fonts on the camera.
- Reading and comparison of plain text and machine-readable code in the same image field.
- Automatic position tracking of the reading range with the resources of "Pat-Genius".
- Automatic text localization without the use of predefined areas means that text can be read even when its position varies.
- Automatic line detection for max. 12 freely definable image regions with max. 15 lines.
- Automatic character height recognition between 15 and 220 pixels.
- Individual parameterization per image region.
- Reading of mirrored, 90° rotated, and inverted text.
- Numerous filter and comparison functions.
- Comparison of text recognition result with an individually specified text per read operation.
- Flexible retrofitting of the text recognition function via the SIMATIC Automation License Manager.
- Simple integration in the automation environment, e.g. via function block of the SIMATIC MV440 devices.

Additional highlights of Text-Genius Plus:

- Simple training of additional characters and fonts (user fonts).
- Adaptation of text recognition by user fonts to the specific requirements of the application to enable:
  - Expansion of defined fonts by missing characters, e.g. special characters.
  - Optimization of recognition for specific printing procedures (e.g. laser, ink, scribed, needled).
  - Optimization of recognition by using different versions of individual characters, e.g. to compensate distortions.
- Up to five user fonts can be used in the reader.
- Very high read reliability can be achieved with a very good print quality (> 99.5%).

© Siemens AG 2013

Text Genius for MV440

Application

Applications for text recognition span across almost all sectors. The application areas can be generally divided in three task areas:

- Text recognition for recording the content of a plain text identification.
- Comparison of the content of a plain text identification with the content of the adjacent machine-readable identification, e.g. Data Matrix Code (DMC).
- Comparison of the content of a plain text identification with individually specified values which are transferred to the reader similar to a printer.

Applications for different sectors are listed below. The list is incomplete and only serves to illustrate the wide range of possible applications.

Automobile industry, aerospace industry

- Detection and checking of plain text identifiers for type identification of components
- Comparison of DMC and plain text
- Acquisition of a unique identification of a product (serialization)
- Acquisition and checking the expiry date

Medical equipment

- Laser markings on implants (DPM)
- Laser markings on medical devices (DPM).

Electronics

- Acquisition of a unique plain text identification for identifying devices, e.g. electricity meters
- Detection and checking of plain text identifiers for type identification of PCBs
- Solar industry (serial numbers on thin-layer modules)
- Acquisition of a unique plain text identifier on thin-layer modules - serialization

Food and beverage industry

- Inspection of expiry date on packaging
- Control of packaging and storage processes

"Text-Genius" and "Text-Genius Plus" can be used anywhere where environmental conditions permit the use of SIMATIC MV440 code readers. For details, see "SIMATIC MV440". Standard ring lights and lenses are designed to achieve IP67 degree of protection by means of the protective barrel, and for glass-free use in the food and beverages industry. If light sources or lenses are used outside the protective barrel, they must be used in compliance with their specification.

The "text recognition" function can be implemented in applications without the need to consider the type of font used for marking (Polyfont) or the marking method. The fonts which enable a maximum read rate to be achieved are listed in the "Function" chapter. Further fonts and additional characters can be added to Text-Genius Plus at any time by training. No marking methods are excluded either. The read rate improves if the font has a stable appearance and when there is a good contrast between the background and marking.

Design

Licenses

All SIMATIC MV440 stationary code readers are basic units under the terms of "Text-Genius" and "Text-Genius Plus" licenses. The text recognition functionality is enabled by transferring the license key from the USB flash drive on which it is supplied to the MV440 code reader by means of SIMATIC License Manager.

Demo mode

The code readers of the MV440 family allow all licensed function packages to be used in demo mode. The function can be used completely. Only output of the results on the communication channels is suppressed. During demo mode, users can then decide which license is required.

Configuration

Various light sources and lenses are available from the accessories portfolio of the SIMATIC MV440 in order to flexibly adapt image recording to a wide range of conditions. The MV440 readers allow configuration in accordance with the desired fieldbus integration, and starting of text recognition by triggering the reader. The measurement result is output immediately after measurement on the predefined process interface. Special sources of light can be used at any time. Interfacing is described in the chapter on SIMATIC MV440.

Function

The outstanding feature of "Text-Genius" and "Text-Genius Plus" is that they are easy to set up. To achieve stable read results for text recognition, it is only necessary to set a few, simple parameters. "Text-Genius" uses a generic approach for text recognition, so no individual training is required for most fonts and the characters (letters and digits) of the ASCII character set. Recognition of several fonts is thus possible with this software without specific training. In particular, no complex settings are required for optimizing recognition performance.

The following fonts are ideal for recognition of the text:

- OCR-A
- Semifont M13
- and similar fonts

Furthermore, Arial, OCR-B and similar fonts also produce good reading results.

"Text-Genius Plus" additionally allows the training of additional characters for any character set. Expansion of the character set is required to allow recognition of characters which are not included or of those which are deformed as a result of the printing process. The character sets of the "Text-Genius" license are available as the basis for text recognition with "Text-Genius Plus" so that text recognition can be started immediately without further training. "Text-Genius Plus" is particularly suitable for applications with a varying print image and unknown fonts.

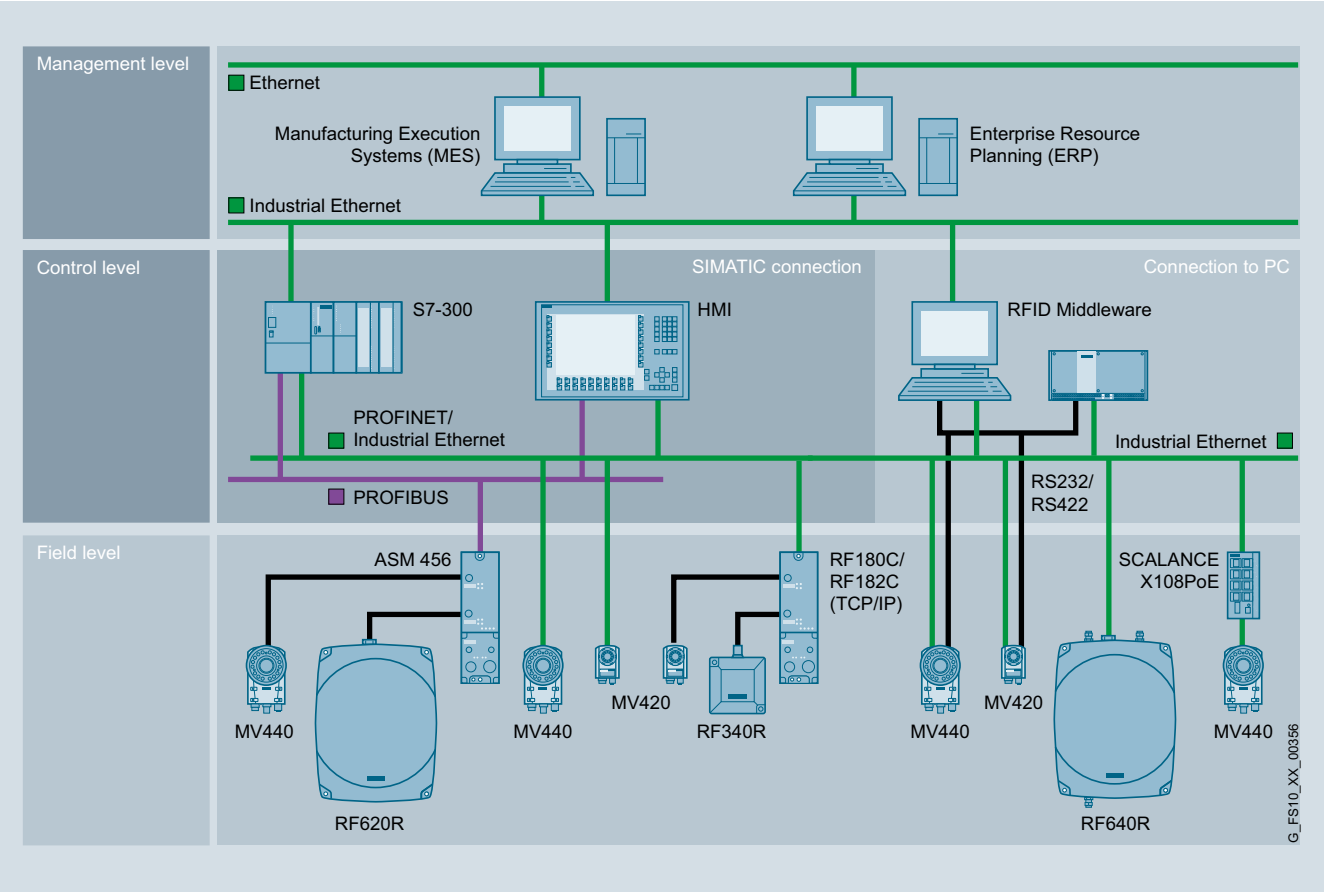
© Siemens AG 2013

Integration

The MV440 text recognition systems can use all communication services that the SIMATIC MV440 basic unit offers:

Usable communication services	
PROFINET IO (FB79)	Onboard MV440 PROFINET interface.
PROFINET IO (FB101, Ident profile)	Onboard MV440 PROFINET interface.
PROFINET IO (FB45, FB101, Ident profile)	Via MV440 communication module interface, using the RF180C communication module.
PROFIBUS DP V0/1 (FB45, Ident profile)	Via MV440 communication module interface, using the ASM 456 communication module.
TCP/IP native	Onboard MV440 PROFINET interface.
RS-232 (ASCII)	Onboard MV440 RS232 interface.

The most important types of interface in the automation environment are shown in the overview below. For further details, refer to the section on SIMATIC MV440.



© Siemens AG 2013

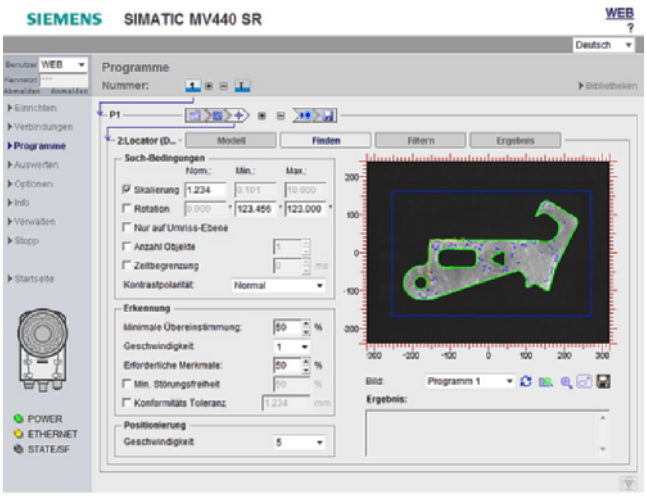
Text Genius for MV440

Selection and ordering data

	Order No.
OCR module Text-Genius Software license for reading machine-readable 1D bar codes and 2 D matrix codes, as well as for optical character recognition. License is supplied on a USB flash drive; executable on SIMATIC MV440 code reading system as of firmware V3.0 (SIMATIC MV440 not included in the scope of supply).	**6GF3400-0SL01**
OCR module Text-Genius Plus Software license for machine-readable text recognition (OCR) and for reading 1D bar codes and 2 D matrix codes. Trainable text recognition allows the training of individual characters or even complete character sets. The character sets of Text-Genius are provided as trained, expandable libraries. License is supplied on a USB flash drive; executable on SIMATIC MV440 code reading system with firmware V5.0 and higher (SIMATIC MV440 not included in the scope of supply).	**6GF3400-1SL01**

© Siemens AG 2013

Overview



Object recognition with Pat-Genius

With the object recognition license "Pat-Genius", devices of the SIMATIC MV440 family can also be used for checking the specifiable structures in the image (verification) in addition to reading 1D barcodes and 2D matrix codes.

The license is supplied as a "Single License" on a USB flash drive and can be installed via the SIMATIC Automation License Manager (ALM) on any reader of the SIMATIC MV440 series. The license can be installed on a SIMATIC MV440 with firmware version 6.0 or higher.

Benefits

get Designed for Industry

- Pat-Genius shape recognition contains the following different partial tasks:
  - Object recognition (classification)
  - Position detection (position, rotational position, scaling)
  - Presence check (object recognition and position check with setpoint specification)
  - Completeness check (multiple presence check with setpoint specification)
  - Text recognition (based on the contour of any character or symbol)
- Pat-Genius is easy to operate thanks to integration into the uniform operator concept for all packages in the operator interface of the MV440 devices
- Pat-Genius can be used together with all other function packages (Text-Genius and Veri-Genius) of the SIMATIC MV440 devices
- Pat-Genius is available to all resolution versions of the SIMATIC MV440 (640 x 480 pixels, 1024 x 768 pixels and 1600 x 1200 pixels)
- Pat-Genius can be flexibly retrofitted for every device of the SIMATIC MV440 series via the Automation License Manager of SIMATIC – advantage: cost benefits in spare parts inventory
- Pat-Genius licenses are transferrable between all SIMATIC MV440 devices without regard for the resolution capacity
- Pat-Genius supports the proved simple integration of the SIMATIC MV440 devices into the automation environment using a function block (FB79, FB45 and FB101) for SIMATIC S7-1200, S7-1500, S7-300 and S7-400 controllers.

Application

The functionality of object recognition is basically suitable for applications such as:

- Pick-and-place machines
- Quality control in production
- Position detection in infeed systems
- Quantity monitoring in infeed systems and production

Pat-Genius can be used wherever environmental conditions permit the use of MV440 code readers - for details, see SIMATIC MV440. Standard ring lights and lenses are available for IP67 degree of protection by means of the protective barrel, and for glass-free use in the food and beverages industry. If light sources or lenses are used outside the protective barrel, they must be used in compliance with their specification.

Any host and HMI systems required must be selected sector-specifically and project-specifically. The range of application of the selected test method is defined in the specification of the test method and compliance is essential if universally valid results are to be obtained.

The following sectors and applications are a particular focus for MV440 verification systems:

Automotive industry

For example:

- testing the manufacturing process: e.g. assembling the body-in-white, etc.
- Access control for semi-finished products for machining stations in the process: cylinder heads, etc.
- Monitoring the uniformity of the assembly quality in the manufacturing process

Pharmaceutical industry

For example:

- Checking of warning information on medicines (e.g.: Caution poison)
- Checking of the correct arrangement of the content and the closing mechanism in the packaging process
- Checking the filling level of packages

Medical equipment

For example:

- Inline quality control and documentation by means of checking completeness and consistent shape

Electronics

For example:

- Inline quality control and documentation by means of checking completeness and shape consistency

Semiconductors

For example:

- Detecting the alignment of components
- Controlling the dimensional accuracy of components

© Siemens AG 2013

Pat-Genius for MV440

Function

Shape detection is an additional function subject to a license that can be activated on any SIMATIC MV440 by installing the Pat-Genius license. The functionality is available without a license in demo mode.

Shape checking detects deviations in the current camera image relative to a learned structure using edge structures

Accordingly, the basic test sequence is as follows:

- Training the object test parameters using one or more good objects
- Testing an object and/or pattern with the features taken from the training
- Testing can be performed on stationary and moving objects
- Checking for a match with the reference provides a good/poor indication after comparison with set-value criteria
- Test results output to three control outputs:
  - OK: Presence of the trained objects and/or pattern found again using the features;
  - OK: Level of agreement greater than setpoint
  - ...
  - N_OK: Presence of the trained object and/or pattern NOT found again using the features;
  - N_OK: Deviation of the level of agreement from the setpoint.
  - ...
- Output of the result information onboard via PROFINET IO, Ethernet, RS232 interface – further interfaces available via communication modules
- "Stand-alone" mode possible using integrated DI/O
- Remote control via PROFIBUS IO, PROFINET DP (via communication module), DI/O or Ethernet
- Platform-independent, web-based interface - Internet-enabled:
  - Monitoring (live image in read mode)
  - Diagnostics (fault image, log information, ...)
  - System administration (software update, ...)
  - Error analysis for troubleshooting for faulty readings
- Triggering of external ring lights

The overall result and the components of a measurement result can be output after a test via different interfaces, and are then available for further processing on an external system, e.g. for archiving or creating a test report.

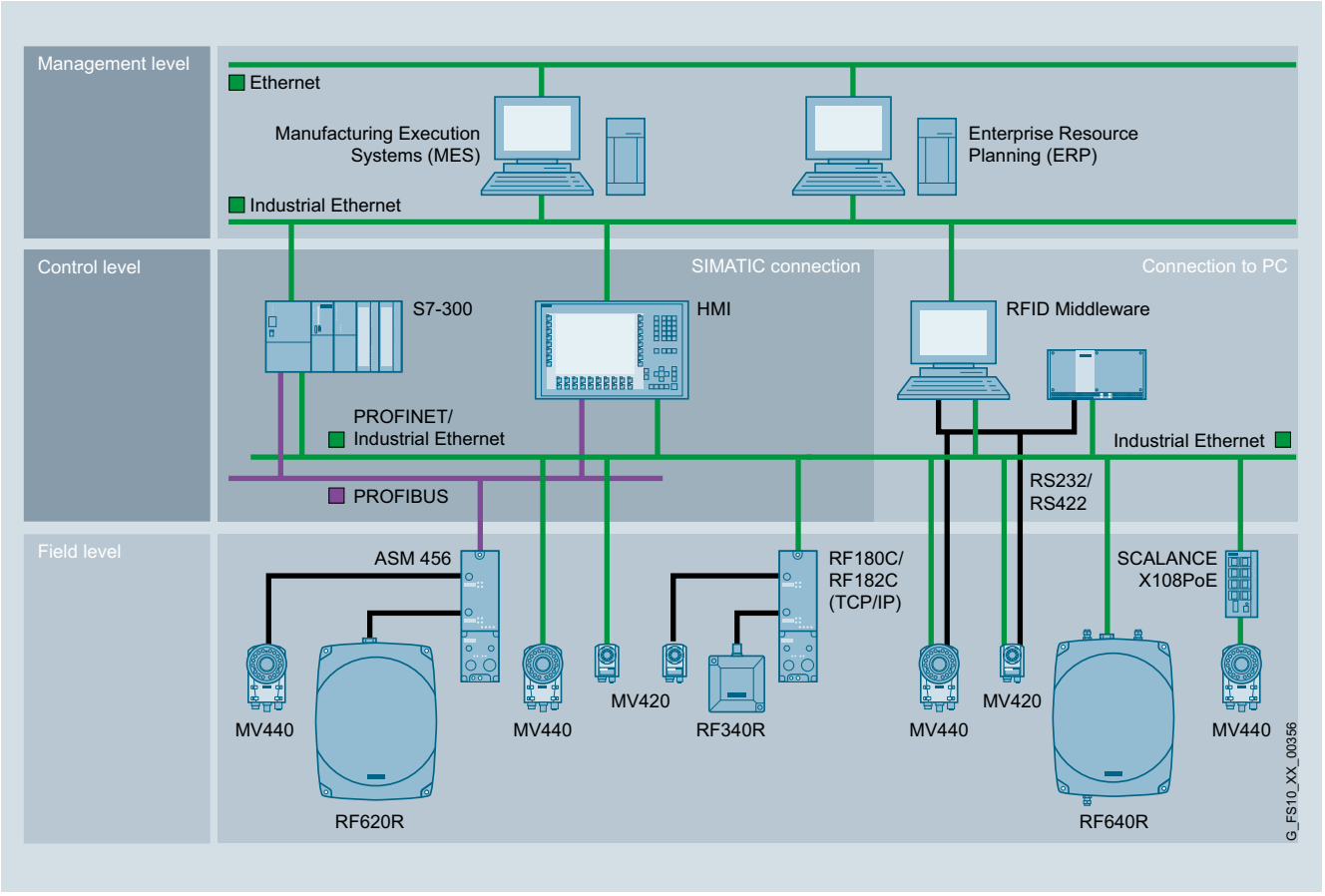
© Siemens AG 2013

Integration

Pat-Genius for MV440 can use all communication services that the SIMATIC MV440 basic unit offers:

Usable communication services	
PROFINET IO (FB79)	Onboard MV440 PROFINET interface.
PROFINET IO (FB101, Ident profile)	Onboard MV440 PROFINET interface.
PROFINET IO (FB45, FB101, Ident profile)	Via MV440 communication module interface, using the RF180C communication module.
PROFIBUS DP V0/1 (FB45, Ident profile)	Via MV440 communication module interface, using the ASM 456 communication module.
TCP/IP native	Onboard MV440 PROFINET interface.
RS-232 (ASCII)	Onboard MV440 RS232 interface.

The most important types of interface in the automation environment are shown in the overview below. For further details, refer to the section on SIMATIC MV440.



Selection and ordering data

	Order No.
SIMATIC "Pat-Genius" license	**6GF3400-0SL03**
Software license for object recognition in image information on products of the SIMATIC MV440 family. The license is supplied on a USB flash drive; usable on all SIMATIC MV440 code reading systems as of firmware V6.0 (SIMATIC MV440 not included in the scope of delivery).	

© Siemens AG 2013

Notes